

FY2013

LAKE CITY ARMY AMMUNITION PLANT
Army Defense Environmental Restoration Program
Installation Action Plan

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Table of Contents

Statement Of Purpose.....	1
Acronyms.....	2
Installation Information.....	5
5-Year / Periodic Review Summary.....	6
Land Use Control (LUC) Summary.....	8
Cleanup Program Summary.....	11
Installation Restoration Program.....	12
IRP Summary.....	13
IRP Contamination Assessment.....	15
IRP Previous Studies.....	17
Installation Restoration Program Site Descriptions.....	23
LCAAP-000 AREA 00 - Pyrotechnics Area.....	24
LCAAP-001 AREA 1 - BUILDING 83 WASTEWATER LAGOONS.....	26
LCAAP-002 AREA 2 - BUILDING 85 WASTEWATER LAGOONS.....	27
LCAAP-003 AREA 3 - SANDPITS.....	29
LCAAP-004 AREA 4 - BUILDING 139 - BACKLINE PONDS.....	31
LCAAP-005 AREA 5 - BUILDING 139 IMPOUNDMENTS.....	33
LCAAP-006 AREA 6 - BUILDING 65 IMPOUNDMENT.....	34
LCAAP-007 AREA 7 - IND. WASTEWATER LAGOON AREA.....	35
LCAAP-008 AREA 8 - SOLID WASTE LANDFILL.....	37
LCAAP-009 AREA 9 - BUILDING 60 TREATMENT FACILITY.....	38
LCAAP-010 AREA 10 - FIRING RANGE WASTE DUMP.....	40
LCAAP-011 AREA 11 - BURNING GROUND.....	41
LCAAP-012 AREA 12 - LABORATORY WASTE LAGOON.....	42
LCAAP-013 AREA 13 - BUILDING #35 DRAINAGE AREA.....	44
LCAAP-014 AREA 14 - TANK FARM.....	45
LCAAP-015 AREA 15 - TEMPORARY SURFACE IMPOUNDMENT.....	46
LCAAP-016 AREA 16 - ABANDONED LANDFILL.....	48
LCAAP-017 AREA 17-SANITARY LANDFILL & SOLVENT PITS.....	50
LCAAP-018 AREA 18-BURNING PITS, LAGOONS & TRE.....	52
LCAAP-019 AREA 19 - BUILDING 1 VICINITY.....	54
LCAAP-020 AREA 20 - BUILDING 2 VICINITY.....	56
LCAAP-021 AREA 21 - BUILDING 3 VICINITY.....	57
LCAAP-022 AREA 22 - DEMOLITION-WASTE DUMP.....	59

Table of Contents

LCAAP-023 AREA 23 - SLUDGE BURIAL PITS.....	60
LCAAP-024 AREA 24-SANITARY WASTEWATER TRTMNT	61
LCAAP-025 AREA 25 - DEMOLITION WASTE DUMP.....	62
LCAAP-026 AREA 26 - DEMOLITION DUMP.....	63
LCAAP-028 AREA 28 - PIPELINE LEAKS.....	64
LCAAP-029 AREA 29 - WESTERN BORDER DUMPS.....	65
LCAAP-030 AREA 30 - BURNING PITS ASH DISPOSAL.....	66
LCAAP-031 AREA 31 - FIREBREAK LANDFILLS.....	67
LCAAP-032 AREA 32 - HOUSE BASEMENT.....	68
LCAAP-033 Area 33 - Blending Pelletizing.....	69
LCAAP-034 Area 34, Site Ditches	70
LCAAP-035 AREA 35 -- SUMPS.....	71
 Installation Restoration Program Site Closeout (No Further Action) Sites Summary.....	 72
 Installation Restoration Program Schedule.....	 73
Installation Restoration Program Milestones.....	73
IRP Schedule Chart.....	76
 Compliance Restoration.....	 78
CR Summary.....	79
CR Contamination Assessment.....	80
CR Previous Studies.....	81
 Compliance Restoration Site Descriptions.....	 82
CC-LCAAP-083 Building 83-TNR.....	83
 Compliance Restoration Site Closeout (No Further Action) Sites Summary.....	 85
 CR Schedule.....	 86
Compliance Restoration Milestones.....	86
CR Schedule Chart.....	87

Statement of Purpose

The purpose of the Installation Action Plan (IAP) is to outline the total multiyear cleanup program for an installation. The plan identifies environmental cleanup requirements at each site or area of concern (AOC), and proposes a comprehensive, installation-wide approach, along with the costs and schedules associated with conducting investigations and taking the necessary remedial actions (RA).

In an effort to coordinate planning information between the restoration manager, the US Army Environmental Command (USAEC), Lake City Army Ammunition Plant (LCAAP), the executing agencies, regulatory agencies, and the public, an IAP was completed. The IAP is used to track requirements, schedules, and tentative budgets for all major Army installation cleanup programs.

All site-specific funding and schedule information has been prepared according to projected overall Army funding levels and is, therefore, subject to change.

Acronyms

ABLF	Abandoned Landfill
AEDB-R	Army Environmental Database-Restoration
AMC	Army Materiel Command
AOC	Area of Concern
AOI	Area of Interest
ARAR	Applicable or Relevant and Appropriate Requirements
ATK	Alliant Tech Systems
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	Contaminant of Concern
DCE	cis-1,2-dichloroethene
DD	Decision Document
DNAPL	Dense Non-Aqueous Phase Liquid
DOE	Department of Energy
DU	Depleted Uranium
EE/CA	Engineering Evaluation/Cost Analysis
ER,A	Environmental Restoration, Army
ERA	Ecological Risk Assessment
ERD	Enhanced Reductive Dechlorination
ESD	Explanation of Significant Differences
FFA	Federal Facilities Agreement
FRA	Final Remedial Action
FS	Feasibility Study
FY	Fiscal Year
GFPR	Guaranteed Fixed Price Remediation
GMP	Groundwater Monitoring Program
GOCO	Government-Owned, Contractor-Operated
IAG	Interagency Agreement
IAP	Installation Action Plan
IR	Installation Restoration
IRA	Interim Remedial Action
IRP	Installation Restoration Program
IRZ	In Situ Reactive Zone
IWOU	Installation-Wide Operable Unit
IWTP	Industrial Wastewater Treatment Plant
K	thousand
kg	kilogram
LAP	Load, Assemble, and Pack
LCAAP	Lake City Army Ammunition Plant
LF	Landfill
LNAPL	Light Non-Aqueous Phase Liquid
LTM	Long-Term Management
LUC	Land Use Control
LUCIP	Land Use Control Implementation Plan
MCL	Maximum Contaminant Level
MDNR	Missouri Department of Natural Resources

Acronyms

MEC	Munitions and Explosives of Concern
mg	milligram
mg/kg	milligrams per kilogram
mm	millimeter
MNA	Monitored Natural Attenuation
MO	Missouri
MPVE	Multi-Phase Vapor Extraction
MR	Munitions Response
N/A	Not Applicable
NAPL	Non-Aqueous Phase Liquid
NECOU	Northeast Corner Operable Unit
NFA	No Further Action
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PBA	Performance-Based Acquisition
PBC	Performance-Based Contract
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
PRB	Permeable Reactive Barrier
PRG	Preliminary Remediation Goal
PRW	Permeable Reactive Wall
RA	Remedial Action
RA(C)	Remedial Action (Construction)
RA(O)	Remedial Action (Operation)
RAB	Restoration Advisory Board
RAWP	Remedial Action Work Plan
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDX	Cyclonite
RI	Remedial Investigation
RIP	Remedy-in-Place
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
SVOC	Semi-Volatile Organic Compound
TA	Temporary Authorization
TAPP	Technical Assistance for Public Participation
TBD	To Be Determined
TCE	Trichloroethylene
TNR	Trinitroresorcinol
TRC	Technical Review Committee

Acronyms

USACE	US Army Corp of Engineers
USAEC	US Army Environmental Command
USATHAMA	US Army Toxic and Hazardous Materials Agency
USEPA	US Environmental Protection Agency
VOC	Volatile Organic Compound
WGPS	Waste, Glass, Paint, and Solvents
WWII	World War II
ZVI	Zero Valent Iron

Installation Information

Installation Locale

Installation Size (Acreage): 3935

City: Independence

County: Jackson

State: Missouri

Other Locale Information

The 3,935 acre LCAAP is located near Independence, Missouri (in Jackson County), 23 miles east of Kansas City, Missouri, three miles north of Blue Springs, two miles southwest of Buckner and adjacent to the village of Lake City.

Installation Mission

LCAAP is an active US Army Joint Munitions Command installation which manufactures and tests small caliber ammunition, including 5.56 millimeter (mm), 7.62 mm, 20 mm, and .50 caliber rounds. It is a government-owned, contractor-operated (GOCO) facility that is operated by Alliant Tech Systems (ATK).

Lead Organization

Army Materiel Command (AMC)

Lead Executing Agencies for Installation

Lake City Army Ammunition Plant

Regulator Participation

Federal

US Environmental Protection Agency (USEPA), Region 7, Superfund Branch

State

Missouri Department of Natural Resources (MDNR), Division of Environmental Quality

National Priorities List (NPL) Status

A score of 33.6 was recorded on 01-JUL-87.

Date for RA(C) Completion: 201509

Date for NPL Deletion: TBD

Installation Restoration Advisory Board (RAB)/Technical Review Committee (TRC)/Technical Assistance for Public Participation (TAPP) Status

RAB established 199703

Installation Program Summaries

IRP

Primary Contaminants of Concern: Explosives, Metals, Munitions and explosives of concern (MEC), Polychlorinated Biphenyls (PCB), Polycyclic Aromatic Hydrocarbons (PAH), Radionuclides, Semi-volatiles (SVOC), Volatiles (VOC)

Affected Media of Concern: Groundwater, Sediment, Soil, Surface Water

CR

Primary Contaminants of Concern: Explosives

Affected Media of Concern: Soil

5-Year / Periodic Review Summary

5-Year / Periodic Review Summary

Status	Start Date	End Date	End FY
Complete	200501	200509	2005
Complete	201001	201104	2011
Planned	201407	201509	2015

Last Completed 5-Year / Periodic Review Details

Associated ROD/DD Name	Sites
Final ROD for IWOU	LCAAP-000, LCAAP-001, LCAAP-002, LCAAP-003, LCAAP-004, LCAAP-005, LCAAP-006, LCAAP-007, LCAAP-008, LCAAP-009, LCAAP-012, LCAAP-013, LCAAP-014, LCAAP-015, LCAAP-019, LCAAP-020, LCAAP-021, LCAAP-022, LCAAP-023, LCAAP-024, LCAAP-025, LCAAP-026, LCAAP-027, LCAAP-028, LCAAP-029, LCAAP-030, LCAAP-031, LCAAP-032, LCAAP-033, LCAAP-034
Final ROD for NECOU	LCAAP-011, LCAAP-016, LCAAP-017
ROD Amendment for Area 18	LCAAP-018

Results IWOU: Areas 2,9,13,23,24&OU-Wide GW remedies protect. of human health & envrn.
Area 18&10 OU: Remedy protect. of human health & envrn.
NECOU: Former RCRA Areas, Areas 11,16B,16C,17B downgrad. plume,17C&17D protect. of human health & envrn.

Actions IWOU: Areas 3 & 30 minor erosion needs to be addressed.

NECOU: Area 16A needs additional monitoring for manganese. Area 17B further action needed at IRZ Lines 1-4.

Plans Minor erosion repairs to be corrected at IWOU 3 & 30. Continue monitoring of manganese in seeps at AREA 16A. Follow-up action for IRZ Lines 1-4 to continue to ensure remedy is protective in the long term.

Recommendations and Implementation Plans:

IWOU - Area 1 - Arsenic has been detected at levels greater than the cleanup goal at monitoring well 02MW021.

Therefore, we increased sampling frequency to quarterly for dissolved and total arsenic initiated.

IWOU - Area 3 Vegetative Cover - Subsidence has been observed which has resulted in standing water on the cover.

Therefore, continued routine inspection and maintenance. Cover repairs have been made.

IWOU - Area 20 - Carbon tetrachloride has been detected at concentrations greater than the cleanup goal at monitoring well 20MW004.

Therefore, continued operation of extraction well 17-CC ensures hydraulic containment of the carbon tetrachloride.

IWOU - Area 30 Vegetative Cover - Minor erosion issues been observed.

Therefore, continued routine inspection and maintenance. Cover repairs have been made.

5-Year / Periodic Review Summary

Recommendations and Implementation Plans:

Area 18 - AOC 2/3 - NAPL present in paleochannel injection wells 18IW033 and 18IW034.

NECOU Area 16A - Groundwater seep containing concentrations of manganese greater than cleanup goals.

Therefore, continued evaluation to ensure concentration remain below the cleanup goal.

NECOU Area 17B Source Area ERD system - Lower-thanexpected injection rates have limited reagent solution distribution.

Therefore, injectability testing currently being completed to achieve performance criteria.

Land Use Control (LUC) Summary

LUC Title: Area 10

Site(s): LCAAP-010

ROD/DD Title: Area 10 ROD

Location of LUC

Area 10, on range

Land Use Restriction: Landfill restriction - Prohibit activities that would impact the LF cap (or cover system) and drainage system, Restrict land use - No daycare/hospital/school use, Restrict land use - No residential use

Types of Engineering Controls: Signs

Types of Institutional Controls: Dig Permits, Restrictions on land use

Date in Place: 201012

Modification Date: N/A

Date Terminated: N/A

Inspecting Organization: EPA

Record of LUC: ECOP (Fed to Fed)

Documentation Date: N/A

LUC Enforcement: Annual Inspections, 5 Year Reviews

Contaminants: RADIOACTIVE

Additional Information

LCAAP provides inspection reports to the regulators. The regulators are invited to all inspections. Most of the time a representative is sent.

METALS are a contaminant as well.

LUC Title: Area 18 LUCIP

Site(s): LCAAP-018

ROD/DD Title: AREA 18 ACTION MEMORANDUM

Location of LUC

Area 18 LUC is located in the north central section of the LCAAP.

Land Use Restriction: Media specific restriction - Prohibit groundwater extraction that interferes with Remedial Action system, Media specific restriction - Prohibit, or otherwise manage excavation, Media specific restriction - prohibit use of groundwater for consumption or domestic purposes, Media specific restriction - restrict drinking water well installation, Media specific restriction - restrict withdrawal or use of groundwater for agricultural/irrigation purposes, Media specific restriction - restrict withdrawal or use of groundwater w/out treatment, Restrict land use - Mitigation area(s) protection, Restrict land use - No daycare/hospital/school use, Restrict land use - No residential use

Types of Engineering Controls: Signs

Types of Institutional Controls: Deed Notices, Dig Permits, Restrictions on Groundwater Withdrawal, Restrictions on land use

Date in Place: 200803

Modification Date: N/A

Date Terminated: N/A

Inspecting Organization: Installation

Record of LUC: Master Plan or Equivalent

Documentation Date: 200803

LUC Enforcement: Annual Inspections, 5 Year Reviews

Land Use Control (LUC) Summary

Contaminants: METALS, PAH, PETROLEUM HYDROCARBON, VOC

Additional Information

N/A

LUC Title: Area 18 LUCIP

Site(s): LCAAP-018

ROD/DD Title: ROD Amendment for Area 18

Location of LUC

Area 18, LCAAP, Independence MO

Land Use Restriction: Restrict land use - No residential use

Types of Engineering Controls: Signs

Types of Institutional Controls: Dig Permits

Date in Place: 200802

Modification Date: N/A

Date Terminated: N/A

Inspecting Organization: Installation

Record of LUC: Master Plan or Equivalent

Documentation Date: 200802

LUC Enforcement: Annual Inspections

Contaminants: METALS, VOC

Additional Information

N/A

LUC Title: LCAAP IWOU LUCIP

Site(s): LCAAP-001, LCAAP-002, LCAAP-003, LCAAP-004, LCAAP-005, LCAAP-006, LCAAP-007, LCAAP-008, LCAAP-009, LCAAP-012, LCAAP-013, LCAAP-014, LCAAP-015, LCAAP-019, LCAAP-020, LCAAP-021, LCAAP-022, LCAAP-023, LCAAP-024, LCAAP-025, LCAAP-026, LCAAP-027, LCAAP-028, LCAAP-029, LCAAP-030, LCAAP-031, LCAAP-032, LCAAP-033, LCAAP-034

ROD/DD Title: Final ROD for IWOU

Location of LUC

IWOU consists of 29 sites that are spread out all over the LCAAP.

Land Use Restriction: Landfill restriction - Prohibit activities that would impact the LF cap (or cover system) and drainage system, Landfill restriction - Prohibit excavation on LF cap or cover system, Landfill restriction - Prohibit installation of utility system lines through the site, Landfill restriction - Restrict construction of buildings that may interfere with LF cap or cover system, Media specific restriction - Prohibit groundwater extraction that interferes with Remedial Action system, Media specific restriction - Prohibit, or otherwise manage excavation, Media specific restriction - prohibit use of groundwater for consumption or domestic purposes, Media specific restriction - restrict drinking water well installation, Media specific restriction - restrict withdrawal or use of groundwater for agricultural/irrigation purposes, Media specific restriction - restrict withdrawal or use of groundwater w/out treatment, Restrict land use - No daycare/hospital/school use, Restrict land use - No residential use

Types of Engineering Controls: Signs

Types of Institutional Controls: Deed Notices, Dig Permits, Restrictions on Groundwater Withdrawal, Restrictions on land use

Date in Place: 200803

Modification Date: N/A

Land Use Control (LUC) Summary

Date Terminated: N/A

Inspecting Organization: Installation

Record of LUC: Master Plan or Equivalent

Documentation Date: 200803

LUC Enforcement: Annual Inspections, 5 Year Reviews, Transferee Reporting

Contaminants: METALS, NITROAROMATICS, PAH, VOC

Additional Information

N/A

LUC Title: NECOU LUCIP

Site(s): LCAAP-011, LCAAP-016, LCAAP-017

ROD/DD Title: Final ROD for NECOU

Location of LUC

The NECOU is located in the north eastern section of the LCAAP.

Land Use Restriction: Landfill restriction - Prohibit activities that would impact the LF cap (or cover system) and drainage system, Landfill restriction - Prohibit excavation on LF cap or cover system, Landfill restriction - Prohibit installation of utility system lines through the site, Landfill restriction - Restrict construction of buildings that may interfere with LF cap or cover system, Landfill restriction - Restrict plantings that interfere LF cap or cover system (roots that penetrate the cap or cover system), Media specific restriction - Prohibit groundwater extraction that interferes with Remedial Action system, Media specific restriction - Prohibit, or otherwise manage excavation, Media specific restriction - prohibit use of groundwater for consumption or domestic purposes, Media specific restriction - restrict drinking water well installation, Media specific restriction - restrict withdrawal or use of groundwater for agricultural/irrigation purposes, Media specific restriction - restrict withdrawal or use of groundwater w/out treatment, Restrict land use - No daycare/hospital/school use, Restrict land use - No residential use

Types of Engineering Controls: Signs

Types of Institutional Controls: Construction Permit, Deed Notices, Dig Permits, Restrictions on Groundwater Withdrawal, Restrictions on land use

Date in Place: 200803

Modification Date: N/A

Date Terminated: N/A

Inspecting Organization: Installation

Record of LUC: Master Plan or Equivalent

Documentation Date: 200803

LUC Enforcement: Annual Inspections, 5 Year Reviews

Contaminants: INORGANICS, METALS, PAH, PETROLEUM HYDROCARBON, VOC

Additional Information

N/A

Cleanup Program Summary

Installation Historic Activity

LCAAP is an active US Army Joint Munitions Command installation, which manufactures and tests small caliber ammunition, including 5.56mm, 7.62mm, and .50 caliber rounds. It is a GOCO facility operated by ATK.

LCAAP was the first new GOCO facility. Established in the early-1940s to expand small caliber ammunition production in the US, construction at this 3,935-acre facility was initiated on Dec. 26, 1940 and completed on Oct. 11, 1941. The plant has operated continuously since then, except for a five-year period between World War II (WWII) and the Korean Conflict. The operating contractor from 1941 to 1985 was Remington Arms. In November 1985 plant operations were assumed by Olin Corporation and in 2000 ATK became the operator.

LCAAP has produced a variety of small arms ammunition since 1941, including .30 caliber, .38 caliber, .50 caliber, 5.56mm, 7.62mm, 20mm, and 30mm ammunition. During WWII, 5.7 billion cartridges were produced, during the Korean Conflict, 1.1 billion were produced and during the Vietnam conflict, 14.4 billion were produced. In 1996, production was about 379 million cartridges. Production has dramatically increased over the past years and is now at 1.5 billion rounds per year.

In 1987, the installation was listed on the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) National Priorities List (NPL) with a score of 33.62. The restoration program is managed in accordance with an interagency agreement (IAG) - federal facilities agreement (FFA).

LCAAP had 5 Operable Units. Four operable units (OUs) have a signed record of decision (ROD): Area 18, Northeast Corner (NECOU), Installation-wide operable unit (IWOU), and Area 10. A ROD issued for Area 18 in 1999 required amending due to the discovery of additional contamination. Besides continuing the pump-and-treat system, source materials have been removed, lead contaminated soil has been treated and placed under a vegetative cap, and multiple in situ reactive zones (IRZs) have been created. The LUCs and monitoring have been implemented.

Remedies have been installed at the NECOU consistent with the ROD and the final plan. The oil and solvent pits have been treated using zero valent iron (ZVI) deep mixed into the contaminated soil. Multiple IRZ injection lines have been installed as well as a new IRZ mixing building to feed many of the injection lines. Contaminated soil has been consolidated or removed from the installation. LUCs and monitoring have been implemented.

The housekeeping removal action has been completed with completion of the removal action for Area 31. The IWOU ROD and plan required the consolidation of contaminated soil (both treated and untreated), removal and off-site disposal of contaminated soil, construction of covers over contaminated areas, and the creation of IRZ areas. LUCs and monitoring also have been implemented.

Area 10 Sand Piles is the last OU at LCAAP. Progress on this OU included a removal action to separate and segregate the depleted uranium (DU) from the sand pile, the segregation and treatment of MEC, and the treatment of the remaining sand for lead followed by on-site disposal and capping. LUCs will be required at this site as well. At a regulatory meeting on Feb. 4, 2008, post-removal requirements were identified as a decision document (DD) and LUC under long-term management (LTM). A removal action was completed in December 2008. A proposed plan and no further action (NFA) ROD have been reviewed and signed by regulators.

Building 83 (Operable Unit 5) is undergoing an EECA.

Installation Program Cleanup Progress

IRP

Prior Year Progress: Operations of four OU remedies (NECOU, IWOU, Area 18, Area 10) have continued.

Future Plan of Action: Operations of all remedies will continue.

CR

Prior Year Progress: Continuing Non Time
Critical Removal Action at site.

Future Plan of Action: Operations of all remedies will continue.

LAKE CITY ARMY AMMUNITION PLANT
Army Defense Environmental Restoration Program
Installation Restoration Program

IRP Summary

Installation Total Army Environmental Database-Restoration (AEDB-R) Sites/Closeout Sites Count: 37/2

Installation Site Types with Future and/or Underway Phases

1	Burn Area (LCAAP-011)
5	Contaminated Fill (LCAAP-019, LCAAP-020, LCAAP-021, LCAAP-023, LCAAP-033)
4	Disposal Pit/Dry Well (LCAAP-003, LCAAP-012, LCAAP-014, LCAAP-018)
2	Drainage Ditch (LCAAP-013, LCAAP-034)
2	Industrial Discharge (LCAAP-000, LCAAP-035)
6	Landfill (LCAAP-008, LCAAP-016, LCAAP-017, LCAAP-022, LCAAP-029, LCAAP-031)
1	Spill Site Area (LCAAP-028)
1	Storage Area (LCAAP-032)
5	Surface Disposal Area (LCAAP-009, LCAAP-010, LCAAP-025, LCAAP-026, LCAAP-030)
7	Surface Impoundment/Lagoon (LCAAP-001, LCAAP-002, LCAAP-004, LCAAP-005, LCAAP-006, LCAAP-007, LCAAP-015)
1	Waste Treatment Plant (LCAAP-024)

Most Widespread Contaminants of Concern

Explosives, Metals, Munitions and explosives of concern (MEC), Polychlorinated Biphenyls (PCB), Polycyclic Aromatic Hydrocarbons (PAH), Radionuclides, Semi-volatiles (SVOC), Volatiles (VOC)

Media of Concern

Groundwater, Sediment, Soil, Surface Water

Completed Remedial Actions (Interim Remedial Actions/ Final Remedial Actions (IRA/FRA))

Site ID	Site Name	Action	Remedy	FY
LCAAP-002	AREA 2 - BUILDING 85 WASTEWATER LAGOONS	IRA	REMOVAL	1990
LCAAP-016	AREA 16 - ABANDONED LANDFILL	IRA	GROUND WATER TREATMENT	1998
LCAAP-017	AREA 17-SANITARY LANDFILL & SOLVENT PITS	IRA	GROUND WATER TREATMENT	1998
LCAAP-017	AREA 17-SANITARY LANDFILL & SOLVENT PITS	IRA	SLURRY WALLS/UNDERGROUND BARRIERS	2003
LCAAP-016	AREA 16 - ABANDONED LANDFILL	IRA	DRAINAGE CONTROLS	2005
LCAAP-016	AREA 16 - ABANDONED LANDFILL	IRA	CAPPING	2005
LCAAP-035	AREA 35 -- SUMPS	FRA	OTHER	2006
LCAAP-035	AREA 35 -- SUMPS	IRA	WASTE REMOVAL - SOILS	2006
LCAAP-001	AREA 1 - BUILDING 83 WASTEWATER LAGOONS	FRA	NATURAL ATTENUATION	2007
LCAAP-002	AREA 2 - BUILDING 85 WASTEWATER LAGOONS	FRA	NATURAL ATTENUATION	2007
LCAAP-003	AREA 3 - SANDPITS	FRA	NATURAL ATTENUATION	2007

IRP Summary

Completed Remedial Actions (Interim Remedial Actions/ Final Remedial Actions (IRA/FRA))

Site ID	Site Name	Action	Remedy	FY
LCAAP-004	AREA 4 - BUILDING 139 - BACKLINE PONDS	FRA	NATURAL ATTENUATION	2007
LCAAP-005	AREA 5 - BUILDING 139 IMPOUNDMENTS	FRA	NATURAL ATTENUATION	2007
LCAAP-007	AREA 7 - IND. WASTEWATER LAGOON AREA	FRA	NATURAL ATTENUATION	2007
LCAAP-009	AREA 9 - BUILDING 60 TREATMENT FACILITY	FRA	WASTE REMOVAL - SOLIDS (NON-SOILS)	2007
LCAAP-009	AREA 9 - BUILDING 60 TREATMENT FACILITY	FRA	WASTE REMOVAL - LIQUIDS	2007
LCAAP-011	AREA 11 - BURNING GROUND	FRA	NATURAL ATTENUATION	2007
LCAAP-012	AREA 12 - LABORATORY WASTE LAGOON	FRA	BIOREMEDIATION - IN SITU	2007
LCAAP-013	AREA 13 - BUILDING #35 DRAINAGE AREA	FRA	NATURAL ATTENUATION	2007
LCAAP-015	AREA 15 - TEMPORARY SURFACE IMPOUNDMENT	FRA	NATURAL ATTENUATION	2007
LCAAP-016	AREA 16 - ABANDONED LANDFILL	FRA	GROUND WATER TREATMENT	2007
LCAAP-017	AREA 17-SANITARY LANDFILL & SOLVENT PITS	FRA	NATURAL ATTENUATION	2007
LCAAP-017	AREA 17-SANITARY LANDFILL & SOLVENT PITS	FRA	BIOREMEDIATION - IN SITU	2007
LCAAP-019	AREA 19 - BUILDING 1 VICINITY	FRA	NATURAL ATTENUATION	2007
LCAAP-020	AREA 20 - BUILDING 2 VICINITY	FRA	NATURAL ATTENUATION	2007
LCAAP-021	AREA 21 - BUILDING 3 VICINITY	FRA	NATURAL ATTENUATION	2007
LCAAP-024	AREA 24-SANITARY WASTEWATER TRTMNT	FRA	NATURAL ATTENUATION	2007
LCAAP-030	AREA 30 - BURNING PITS ASH DISPOSAL	FRA	NATURAL ATTENUATION	2007
LCAAP-036	PBC Site at LCAAP	FRA	GROUND WATER TREATMENT	2007
LCAAP-000	AREA 00 - Pyrotechnics Area	FRA	NATURAL ATTENUATION	2008
LCAAP-018	AREA 18-BURNING PITS, LAGOONS & TRE	FRA	GROUND WATER TREATMENT	2008
LCAAP-018	AREA 18-BURNING PITS, LAGOONS & TRE	IRA	GROUND WATER TREATMENT	2008
LCAAP-010	AREA 10 - FIRING RANGE WASTE DUMP	IRA	WASTE REMOVAL - SOILS	2009

Duration of IRP

Date of IRP Inception: 197906

Estimated Date for Remedy-In-Place (RIP)/Response Complete (RC): 200909/209909

Date of IRP completion including Long Term Management (LTM): 209909

IRP Contamination Assessment

Contamination Assessment Overview

LCAAP is jointly regulated by the USEPA Region 7 and the MDNR. A Superfund Amendments and Reauthorization Act (SARA) 120 IAG was signed by the Department of the Army, the USEPA and the MDNR, effective Nov. 28, 1989. LCAAP is divided into four OUs: Area 10, Area 18, NECOU, and IWOU.

In 1979 an installation assessment was conducted to assess the environmental quality of the facility. This report recommended that the installation should monitor the groundwater beneath the sandpits in the northwest corner of the installation.

In 1985 the Army initiated a preliminary assessment/site inspection (PA/SI) for LCAAP. Several areas of contamination were identified and sampling was implemented. The PA/SI involved the installation of 24 groundwater monitoring wells at seven sites, and the analysis of 48 soil and water samples. All seven areas sampled detected contaminants in the groundwater, including VOCs, SVOCs, explosives and metals. The results of the fieldwork showed groundwater contamination in several areas across LCAAP. Constituents included VOCs and SVOCs, metals and explosives. The Area 18 OU (LCAAP-018) had several old burn pits and trenches contaminated with organics and metals, as well as a groundwater contamination plume. The NECOU (LCAAP-011,-016,-017) contains contaminated oil and solvent pits, an abandoned landfill (ABLF), a waste, glass, paints, and solvents (WGFS) area, and a [Resource Conservation and Recovery Act (RCRA)] closed metals-and-explosives-contaminated burning ground. The IWOU has a number of areas with surface and subsurface contamination, primarily metals and VOCs. The Area 10 OU had sand piles contaminated with DU and lead.

Water from several of the plant's production/ potable wells contains VOCs in excess of drinking water standards. In January 1990 air strippers were installed for three wells and in 1992 they were installed for four additional wells. Residential potable water wells north of LCAAP have been sampled since 1987. The samples do not indicate any contamination above regulatory standards.

The comprehensive groundwater monitoring program (GMP), which began in June 1994, monitored CERCLA perimeter wells on a biennial basis. Surface water locations and water supply wells were also sampled biennially as part of the GMP.

In 1996, groundwater contaminated primarily with trichloroethylene and 1,2-dichloroethane, was discovered at the northern LCAAP perimeter in Area 16. A time critical removal action (EW-2) was conducted to contain the contaminants. In 2002 off-post screening investigations on the Summers property were performed. The results indicated that contaminants had migrated off-installation.

In March 1997 the Area 18 pump-and-treat system (which began as a removal action) began operations. In April 1999 the system became the object of a ROD, and continues to operate. A multi-phase vapor extraction (MPVE) system and remediation of lead contaminated soil were also identified in the ROD. Data collected after the ROD indicated that the plume extent was greater than originally defined. The design of the MPVE system was discontinued pending further site characterization. The removal contract to excavate and dispose of lead-contaminated soils was terminated due to the discovery of PCBs in surface and near surface soils. A ROD amendment issued in 2007 has been completed. Construction of the remedy, including establishment and maintenance of IRZ, is complete.

In September 1998 an interim remedial action (IRA) ROD was signed for installation of a permeable reactive barrier (PRB) to treat groundwater from sources in the NECOU. The PRB was installed between July 2000 and January 2001. An IRA for the repair of cover material and collection of leachate for the ABLF has been completed. Cracks in the ABLF cover were repaired and three feet of additional cover was placed over the waste material. Leachate was collected, analyzed and treated. A final ROD, as well as construction of the remedy, has been completed.

The IWOU ROD for the IWOU is complete. The removal action has been completed for five sites (housekeeping sites). Another removal action has been completed for removal or cleaning of abandoned sumps (LCAAP-035). Construction of the remedy is complete.

Characterization sampling and treatability testing were completed on the Area 10 Sand Piles (funded by the Army Field Support Command). An engineering evaluation/cost analysis (EE/CA) was completed and has been partially implemented to address the DU, MEC and lead contaminants. Future phases (actions) determined during a meeting of regulatory and Army stakeholders on Feb. 4, 2008 include development of a DD and, at a minimum, LUCs as part of LTM. The removal action was completed in December 2008 and was quality controlled by the Nuclear Regulatory Commission (NRC). A proposed plan (PP) and an NFA ROD were reviewed and approved by the regulators.

IRP Contamination Assessment

Cleanup Exit Strategy

Operation of remedial systems at Area 18 will continue until cleanup goals are reached or, for the VOC source area, an impracticability decision is reached. Institutional controls will be implemented.

RAs and monitoring for the NECOU will continue until cleanup goals are reached or, for the Area 17B source area, an impracticability decision is reached. LUCs will be instituted as necessary.

RAs will be operated for the IWOU and LUCs will be instituted.

Area 10 LUCs will be instituted as necessary.

Area 83/Building 83-demolition and removal to occur.

IRP Previous Studies

	Title	Author	Date
1980	Installation Assessment of Lake City Army Ammunition Plant	USATHAMA	MAY-1980
1989	Lake City Army Ammunition Plant Preliminary Assessment/Site Inspection	USATHAMA	JAN-1989
1990	Final Phase I Remedial Investigation Report for Lake City Army Ammunition Plant, Volumes 1 & 2	USATHAMA	JUN-1990
	Installation Restoration Program Conceptual Program for Lake City Army-Ammunition Plant	USATHAMA	DEC-1990
	Assessment of Applicable or Relevant and Appropriate Requirements, (ARARS) for LCAAP	USATHAMA	DEC-1990
1991	Data Deliverables for the Northeast Corner Operable Unit Lake City Army Ammunition Plant	USATHAMA	MAR-1991
	Data Deliverables for the Phase II Remedial Investigations Lake City Army Ammunition Plant	USATHAMA	MAR-1991
	Final Phase I Remedial Investigation Report on Lake City Army Ammunition Plant, Volume III	USATHAMA	MAR-1991
1994	Final Engineering Evaluation/Cost-Analysis Report for a Non-Time-Critical Removal Action for the Area 18 Operable Unit at Lake City Army Ammunition Plant,	USAEC	NOV-1994
1995	Final RI Report of the Area 18 Operable Unit at Lake City Army Ammunition Plant, Volume 1: Text, Volume 2, Appendices	USAEC	JAN-1995
	Final RI Report of the Northeast Corner Operable Unit at Lake City Army Ammunition Plant, Volume 1: Text, Volume 2: Appendices	USAEC	MAR-1995
	Final Feasibility Study Report of the Area 18 Operable Unit at LCAAP	LCAAP	SEP-1995
	Final Feasibility Study Report of the Area 18 Operable Unit at LCAAP	LCAAP	SEP-1995
1997	Landfarming Treatability Pilot Study Report, Independence, Missouri	LCAAP	MAR-1997
2002	Final Summary Report, Summers Property Groundwater Investigation, Lake City Ammunition Report, Independence, Missouri	LCAAP	DEC-2002
2004	Final Site-Wide Groundwater Strategy, Lake City Army Ammunition Plant,	ARCADIS	AUG-2004
2005	Community Relations Plan for Lake City Army Ammunition Plant Installation Remediation Program	LCAAP	JAN-2005
	Data Summary Report Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Investigation Vol. 1V	ARCADIS	JAN-2005
	Data Summary Report Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Investigation	ARCADIS	JAN-2005

IRP Previous Studies

2005

Title	Author	Date
Vol. 2 Appendices		
Data Summary Report Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Investigation Vol. 3 Area 35 Sumps	ARCADIS	JAN-2005
Data Summary Report Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Investigation Vol. 1	ARCADIS	JAN-2005
Data Summary Report Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Investigation Vol. 1V	ARCADIS	JAN-2005
Data Summary Report Area 18 Operable Unit EPA ID No. Mo3213890012	ARCADIS	FEB-2005
Final Background Characterization Report	ARCADIS	FEB-2005
Final Background Characterization Report, Lake City Army Ammunition Plant	ARCADIS	FEB-2005
Final 2003 & 2004 ANNUAL REPORT for Building 163 OPERATIONS	The Flat water Group, Inc.	MAR-2005
FINAL Field Pilot Test Work Plan NECOU	ARCADIS	APR-2005
Direct Push Data Collected per the Work Plan Addendum for supplemental Data Collection (The Flatwater Group, March 2003)	ARCADIS	MAY-2005
Data Summary Report Area 18 Operable Unit	ARCADIS	JUN-2005
FINAL 2004 Site-Wide Groundwater Monitoring Report	ARCADIS	JUL-2005
Final 2004 Site-Wide Groundwater Monitoring Report, Lake City Army Ammunition Report		JUL-2005
Technical Memorandum on 2005 Verification Simulation for Paleochannel Lake City Army Ammunition Plant Groundwater Flow Model	ARCADIS	AUG-2005
Final Inactive Sumps Removal Action Engineering Evaluation/Cost Analysis (EE/CA)	The Flatwater Group, Inc	SEP-2005
Final Inactive Sumps Removal Action Engineering Evaluation/Cost Analysis, Lake City Army Ammunition Plant	The Flatwater Group, Inc	SEP-2005
Final Area 10 Sand Piles Engineering Evaluation and Cost Analysis, Lake City Army Ammunition Plant	US Army Field Support Command	OCT-2005
FINAL Data Quality Assessment Report for Inactive Sumps Installation-Wide Operable Unit	The Flatwater Group, Inc	DEC-2005
Site-wide Groundwater Monitoring Report	ARCADIS	DEC-2005

2006

Removal Action Report Abandoned Landfill Area 16	TN & Associates, Inc.	MAR-2006
Final Remedial Investigation/Feasibility Study Report-Addendum Area 18 Operable Unit Volume 1 Part 1 Remedial Investigation Report Addendum	ARCADIS	MAY-2006
Final Remedial Investigation/Feasibility Study Report-Addendum Area 18 Operable Unit Volume 3 Appendices P-T	Arcadis	MAY-2006
Final Remedial Investigation/Feasibility Study Report-Addendum Area 18 Operable Unit Volume 2 Part 2 Feasibility Study Report Addendum and Appendices A-O	Arcadis	MAY-2006

IRP Previous Studies

2006

Title	Author	Date
Building #420, Soil Investigation (Two Phases), Red River Army Depot	ARCADIS	JUL-2006
Final Remedial Investigation/feasibility Study Report-Addendum NECOU Volume 3 Appendices G-Q	ARCADIS	JUL-2006
Final Remedial Investigation/Feasibility Study Report Addendum NECOU Volume 1 Part 1 Remedial Investigation Report Addendum	ARCADIS	JUL-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 6 Remedial Investigation/Feasibility Study for Area 6	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 13 Study for Area 19	ARCADIS	AUG-2006
Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 8 Book 2	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Volume 12 Remedial Investigation/ Feasibility Study for Area 14	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 15 Study for Area 21	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 16 Study for Area 22	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 21 Study for Area 30	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 14 Study for Area 20	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 3 Remedial Investigation/Feasibility Study for Area 3	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 24 Study for Area 34	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 17 Study for Area 23	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 23 Study for Area 33	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 25a Study for Area 2	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 25b Study for Area 15	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 18 Study for Area 24	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 25c Study for Area 25	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 25d Study for	ARCADIS	AUG-2006

IRP Previous Studies

2006

Title	Author	Date
Area 26		
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 1 Background	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 19 Study for Area 28	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 22 Study for Area 32	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 25e Study for Area 31	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 20 Study for Area 29	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 10 Area 12	ARCADIS	AUG-2006
Final Installation Wide Operable Unit Remedial Investigation/Feasibility Study Volume 26 IWOU-Wide Groundwater	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume ES-Executive Summary	ARCADIS	AUG-2006
Final Installation -Wide Operable Unit Remedial Investigation/Feasibility Study Volume 2 Remedial Investigation/Feasibility Study for Area 1	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 4 Remedial Investigation/Feasibility Study for Area 4	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 5 Remedial Investigation/Feasibility Study for Area 5	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/ Feasibility Study Volume 8 Remedial Investigation/Feasibility Study for Area 8 Book 1	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 7 Remedial Investigation/Feasibility Study for Area 7	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/Feasibility Study Volume 9 for Area 9	ARCADIS	AUG-2006
Final Installation-Wide Operable Unit Remedial Investigation/ Feasibility Study Volume 11 Remedial Investigation/Feasibility Study for Area13	ARCADIS	AUG-2006
Final Report --Munitions Response at Area of Interest (AOI) 31A	PIKA International, Inc	SEP-2006
Final 2005 Site-Wide Groundwater Monitoring Report	ARCADIS	OCT-2006

2007

Removal Action Completion Report for Inactive Sumps	ARCADIS	MAY-2007
Installation-Wide Operable Unit Housekeeping Removal Action Completion Report	ARCADIS	SEP-2007

2008

Area 10 Sand Piles Removal Action Explanation of	Cabrera	JAN-2008
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IRP Previous Studies

2008

Title	Author	Date
Significant Differences		
Record of Decision for the Installation-Wide Operable Unit	ARCADIS	JAN-2008
2006 Site-wide Groundwater Monitoring Report	ARCADIS	JAN-2008
Final Explanation of Significant Differences (ESD)	Cabrera	JAN-2008
RCRA Part B Temporary Authorization (TA) Request	Cabrera	JAN-2008
Technical Memorandum regarding survey detection sensitivity	Cabrera	JAN-2008
Draft Final WP -Area 10	Cabrera	FEB-2008
Final Action Memorandum -Area 10	Cabrera	FEB-2008
Draft Final FSSP -Area 10	Cabrera	FEB-2008
Revised ESS	Cabrera	MAR-2008
errata pages for the Draft Final Area 10 Work Plan	Cabrera	MAR-2008
ESS Rev. 1	Cabrera	APR-2008
errata pages for the Final Area 10 Sand Piles Action Memorandum	Cabrera	APR-2008
Technical Memorandum comparing options for site closure	Cabrera	MAY-2008
ESS (Rev. 2)	Cabrera	MAY-2008
Revised Final Area 10 Sand Piles Action Memorandum	Cabrera	JUL-2008
Second Revised Final Area 10 Sand Piles Action Memorandum	Cabrera	AUG-2008
Final Area 10 Removal Action Work Plan	Cabrera	OCT-2008
Draft Post Closure Report, Mercurous Nitrate Treatment Plant and Storage Facility	ARCADIS	NOV-2008
Work Plan Amendment -Area 10	Cabrera	NOV-2008
Action Work Plan, Area 18 Operable Unit	ARCADIS	DEC-2008
100 Percent Remedial Design/Remedial Action Work Plan, Installation-Wide Operable Unit	ARCADIS	DEC-2008

2009

Draft Area 10 Final Status Survey Plan	Cabrera	FEB-2009
Draft IRACR	ARCADIS	APR-2009
Internal Draft and Draft Proposed Plan for Area 10	CABRERA	MAY-2009
(1) Draft Final Area 10 Sand Piles Removal Action Project Completion Report	CABRERA	JUL-2009
Draft Final Record of Decision for Area 10	CABRERA	JUL-2009
(1) Final Area 10 Sand Piles Removal Action Completion Report	CABRERA	AUG-2009
Final Area 10 Sand Piles Record of Decision	CABRERA	AUG-2009
Draft Final Interim Remedial Action Completion Report for Area 18 and IWOU	ARCADIS	AUG-2009

IRP Previous Studies

	Title	Author	Date
2009	Work Plan Amendment for Mechanical Processing	CABRERA	SEP-2009
	Explosives Safety Submission Amendment	CABRERA	SEP-2009
	Work Plan Amendment for Mechanical Processing at Gate 21A	CABRERA	SEP-2009
	Draft Final Interim Remedial Action Completion Report for Area 18 and IWOU	ARCADIS	SEP-2009
	Draft NECOU Technical Impracticability Waiver Evaluation Report	ARCADIS	OCT-2009
	Area 10 Sand Piles ROD	CABRERA	DEC-2009
	2009 Land Use Control Compliance Report	US ARMY	DEC-2009
2010	LCAPP Area 10 Sand Piles Land Use Control and Implementation Plan	CABRERA	DEC-2010
2011	Area 00 RD-RA Work Plan	Arcadis	MAR-2011
	Final Five-Year Review Report	Arcadis	MAR-2011
	Area 10 After Action Report	CABRERA	APR-2011
	Closure Report for RCRA Part B Permit Temporary Authorization	CABRERA	MAY-2011

LAKE CITY ARMY AMMUNITION PLANT
Installation Restoration Program
Site Descriptions

Site ID: LCAAP-000

Site Name: AREA 00 - Pyrotechnics Area

STATUS

Regulatory Driver: CERCLA

RRSE:

Contaminants of Concern: Semi-volatiles (SVOC), Volatiles (VOC)

Media of Concern: Groundwater

Phases	Start	End
PA.....	200605.....	200704
SI.....	200705.....	200707
RA(C).....	200708.....	200809
RA(O).....	200708.....	206909

RIP Date: 200809

RC Date: 206909

SITE DESCRIPTION

This area consists of the Pyrotechnics Manufacturing Area west of Area 13. There are 15 inactive sumps in this Area that were investigated as part of the Inactive Sumps Removal Action. The sumps in the Pyrotechnics Manufacturing Area are not located within any of the previously assigned LCAAP Areas that comprise the Installation Wide Operable Unit (IWOU). Area 00 is located within the active manufacturing area. The suspect sources of potential contamination are the building sumps. Area 00 was part of the Inactive Sumps Removal Action (May 2007) that included removal of sumps and surface soil associated with VOC, PAH, and metals contamination in this area. Many of the buildings in Area 00 are currently used on a regular basis by LCAAP site employees in BLDG 35 or one of the other complexes.

The primary contaminants of interest at Area 00 are nitrobenzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, perchlorate, carbon tetrachloride, chloroform, aluminum, arsenic, barium, beryllium, cadmium, iron, lead, manganese, and vanadium. Results of sampling associated with the Inactive Sumps Removal Action (found in the Final Sump Completion Report, May 2007) indicate that these contaminants of interest are not present in soil above human health or ecological risk levels. The results of the inactive sump investigation at Area 00 were presented in the Area 13 RI/FS document. PAHs and carbon tetrachloride in groundwater will be addressed as part of the site-wide groundwater.

Site LCAAP-000 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. Site LCAAP-000 includes the Pyrotechnics Manufacturing Area, and is located west of Area 13. LCAAP-000 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. The ROD requires monitored natural attenuation for an estimated 61 years, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs). Area 00 has no further response for soils. Response completion estimated in 2069. LUCs are required at this site. This site is currently in the RA(O) phase.

CLEANUP/EXIT STRATEGY

Site ID: LCAAP-000
Site Name: AREA 00 - Pyrotechnics Area

Monitored natural attenuation for an estimated 61 years, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs). Response completion estimated in 2069.

Site Name: AREA 1 - BUILDING 83 WASTEWATER LAGOONS

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Metals

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	204309

RIP Date: 200709

RC Date: 204309

SITE DESCRIPTION

Area 1 is located in the south-central portion of the Installation, north of the Big Ditch and west of Owens Schoolhouse Road. Neutralized wastewater from the production of trinitroresorcinal was discharged into lagoons. A total of five RCRA lagoons have operated intermittently in this Area from 1941 through 1986. Four of the five lagoons were removed under an approved RCRA closure plan between 1986 and 1988. A post-closure plan included post-closure care and groundwater monitoring requirements.

The primary contaminants of interest at Area 1 are arsenic, chromium, and lead. Results of recent sampling indicate that these contaminants are not present in soil above human health or ecological risk levels. However, arsenic in groundwater will be addressed as part of the site-wide groundwater.

A final ROD has been completed. There will be no further response for soils. Post-closure monitoring wells will be grouped by their respective RCRA units. Downgradient wells and upgradient wells (if available) for the RCRA units will be evaluated together to determine groundwater quality conditions in the vicinity of the RCRA unit. Following 3 consecutive years of no detections above groundwater cleanup goals in a downgradient well, then sampling from that well shall be suspended. At that time, sampling will be discontinued in upgradient wells associated with the same unit. There will be no further response for soil in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast here) of post-closure sampling will be completed. Response Completion estimated in 2043. LUCs are required at this site.

Site LCAAP-001 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-01 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU.

CLEANUP/EXIT STRATEGY

Post-closure monitoring wells will be grouped by their respective RCRA units. Downgradient wells and upgradient wells (if available) for the RCRA units will be evaluated together to determine groundwater quality conditions in the vicinity of the RCRA unit. Following 3 consecutive years of no detections above groundwater cleanup goals in a downgradient well, then sampling from that well shall be suspended. At that time, sampling will be discontinued in upgradient wells associated with the same unit. There will be no further response for soil in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast in MFR) of post-closure sampling will be completed. Response Completion estimated in 2043.

Site Name: AREA 2 - BUILDING 85 WASTEWATER LAGOONS

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Metals

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
IRA.....	198805.....	198910
RA(C).....	200309.....	200709
RA(O).....	200709.....	204309

RIP Date: 200709

RC Date: 204309

SITE DESCRIPTION

Area 2 is located in the south-central portion of the Installation, immediately north of Area 1. The main manufacturing buildings located within Area 2 are Buildings 83A and 85. Neutralized wastewater from the production of lead-based initiating compounds (tetrazene, lead styphnate) was discharged into two large lagoons and one small lagoon. The two large lagoons were removed in 1990 as part of a MDNR approved RCRA Closure. A post-closure plan included post-closure care and groundwater monitoring requirements.

The primary contaminant of concern at Area 2 is lead. Remedial action was necessary to prevent exposure to contaminated soils and to reduce the mobility of lead in soil. Soils with lead levels above 1,197 mg/kg were removed in 2007. Post-closure and verification monitoring of groundwater will be completed. According to the IWOU RD/RAWP, sampling for a monitoring well is to be suspended if no detections above groundwater cleanup goals (CUGs) are observed following three consecutive years in a downgradient well. At that time, sampling is to be discontinued in upgradient wells associated with the same unit. Wells upgradient of a RCRA unit will continue to be sampled annually (even if three consecutive years of no detections above CUGs are observed) until all downgradient wells associated with that specific RCRA unit have met the CUGs for three consecutive years. If concentrations above area-specific CUGs continue to increase for three consecutive rounds, the monitoring program will be reevaluated to determine the appropriate response action. Post-closure and verification monitoring of groundwater will be completed for an additional 30 years (due to showing 30 year forecast here). Response Completion estimated in 2043. This site is currently in the RA(O) phase.

Site LCAAP-002 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-02 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU.

CLEANUP/EXIT STRATEGY

Post-closure and verification monitoring of groundwater will be completed. Sampling is to be suspended if no detections above groundwater cleanup goals (CUGs) are observed following three consecutive years in a downgradient well. At that time, sampling is to be discontinued in upgradient wells associated with the same unit. Wells upgradient of a RCRA unit will continue to be sampled annually (even if three consecutive years of no detections above CUGs are observed) until all downgradient wells

Site ID: LCAAP-002

Site Name: AREA 2 - BUILDING 85 WASTEWATER LAGOONS

associated with that specific RCRA unit have met the CUGs for three consecutive years. If concentrations above area-specific CUGs continue to increase for three consecutive rounds, the monitoring program will be reevaluated to determine the appropriate response action. Post-closure and verification monitoring of groundwater will be completed for an additional 30 years (due to showing 30 year forecast in MFR). Response Completion estimated in 2043.

Site ID: LCAAP-003
Site Name: AREA 3 - SANDPITS

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Metals, Polycyclic Aromatic Hydrocarbons (PAH)

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200609.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	200909
LTM.....	200910.....	204309

RIP Date: 200709

RC Date: 200909

SITE DESCRIPTION

Area 3 is located in the far northwest corner of the Installation, north of the main gate. A series of sand quarry pits and small lagoons were used from the 1950s through the mid-1970s for disposal of Installation construction materials and demolition/remodeling debris, industrial wastewater treatment plant (IWTP) sludge, and some off-site material.

The primary contaminant of concern at Area 3 is benzo(a)pyrene. Benzo(a)pyrene is present in soil at Area 3 above the human health risk levels and may pose a risk to future site workers who might be exposed to benzo(a)pyrene in surface soil via incidental ingestion and inhalation of wind-blown fugitive dust. In addition, it was determined in the Ecological Risk Assessment (ERA) (August 2006) that there are some locations in Area 3 where exposure to soil impacted with PAHs, copper, and zinc may pose an unacceptable risk to terrestrial ecological receptors.

A record of decision (ROD) has been completed in January 2008. Remedial action was necessary to prevent exposure to contaminated soils. A vegetative cover was completed in 2007. Remedial action was necessary to prevent exposure to contaminated soils. A vegetative cover was completed in 2007. Although chemicals are not present in groundwater at Area 3 that present a potentially unacceptable risk, groundwater was to be monitored for an estimated 2 years to ensure that waste does not impact groundwater (per the 100% Remedial Design/Remedial Action Work Plan December 2008, attached). Following two consecutive sample events resulting in concentrations less than cleanup goals (CUGs), sampling will be discontinued. Two of the three wells within Area 3, 03MW020 and 03MW023, are eligible for discontinuation due to results below CUGs in 2008 and 2009. Well 03MW021 was removed from the sampling program prior to 2008 due to results below CUGs for at least two consecutive years prior to 2008. At 03MW018, COCs were below CUGs in 2011; however sampling was continued through 2013 due to the 2009 results indicating an arsenic exceedance slightly above the CUG (12.8 ig/L compared to a CUG of 10 ig/L). As shown in the 2012 O&M Report, sampling will be discontinued at all three existing wells within Area 3: 03MW018, 03MW020, and 03MW023. Groundwater results from wells 03MW020 and 03MW023 indicate COCs have remained below CUGs for two consecutive years in 2008 and 2009. Groundwater results collected from 03MW018 were below CUGs in 2011 and 2012. Sampling will therefore be discontinued from 03MW018 in 2013. LUCs are required at this site for sitewide groundwater.

Site LCAAP-003 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-003 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. The ROD required operation and maintenance, tracked under the remedial action (operations) (RAO) phase, for groundwater and land use controls (LUCs), but has since been placed into Long Term Monitoring.

Site ID: LCAAP-003
Site Name: AREA 3 - SANDPITS

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected (vegetative cover) and maintained for LUCs.

Site Name: AREA 4 - BUILDING 139 - BACKLINE PONDS

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Explosives, Polycyclic Aromatic Hydrocarbons (PAH), Volatiles (VOC)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	204309

RIP Date: 200709

RC Date: 204309

SITE DESCRIPTION

Area 4 is located in the south-central portion of the Installation on the southern end of the Fuse Line Area. A series of small lagoons were used for disposal of wastewater from the neutralization of lead styphnate slurry, lead azide, primer mix, and cyclonite (RDX). Two small lagoons also accepted chemical laboratory wastes. The wastewater lagoons were removed between 1985 and 1987 as part of a MDNR approved RCRA closure. A post-closure plan included post-closure care and groundwater monitoring requirements. The primary contaminants of interest at Area 4 are PAHs, vinyl chloride, arsenic, chromium, antimony, RDX, chloroethane, and benzene. Area 4 was part of the Inactive Sumps Removal Action which removed sumps and surface soil associated with explosives contamination in this Area. Results of recent sampling indicate that these contaminants of interest are not present in soil or groundwater above human health or ecological risk levels.

Sump 136ASU1 was left in place due to inaccessibility or current site operations preventing the excavation and removal. As shown in the 100% RDRAWP (December 2008) Verification sampling in this area from wells situated downgradient from the sump will be performed until the sump is removed. The data will be evaluated to determine increasing/decreasing trends of detections of area-specific contaminants of concern above the cleanup goals. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. There will be no further response for soil or groundwater in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast here) of post-closure sampling will be completed. Additional verification sampling will be completed downgradient of Sump 136ASU1 until it is removed. Response completion estimated in 2043.

Site LCAAP-004 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-004 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. This site is currently in the RA(O) phase.

CLEANUP/EXIT STRATEGY

Site ID: LCAAP-004

Site Name: AREA 4 - BUILDING 139 - BACKLINE PONDS

Sump 136ASU1 was left in place due to inaccessibility or current site operations preventing the excavation and removal. Verification sampling in this area from wells situated downgradient from the sump will be performed until the sump is removed. The data will be evaluated to determine increasing/decreasing trends of detections of area-specific contaminants of concern above the cleanup goals. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. There will be no further response for soil or groundwater in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast in MFR) of post-closure sampling will be completed. Additional verification sampling will be completed downgradient of Sump 136ASU1 until it is removed. Response completion estimated in 2043.

Site Name: AREA 5 - BUILDING 139 IMPOUNDMENTS

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Explosives, Metals, Volatiles (VOC)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	209909
RIP Date:	200709	
RC Date:	209909	

SITE DESCRIPTION

Area 5 is located in the central portion of the Installation, north of Area 4 and within the Fuse Line Area. Neutralized wastewater from the production of explosive compounds (TNR, RDX) at Building 139 was discharged into a lagoon as well as from solvent cleaning and disposal activities. The lagoon operated intermittently and ceased operations in 1990. RCRA closure was performed during 1989 under an MDNR approved closure plan. A post-closure plan included post-closure care and groundwater monitoring requirements.

The primary contaminants of interest at Area 5 are antimony, lead, trichloroethene (TCE), cis-1,2- dichloroethene (DCE), vinyl chloride, RDX, 2-nitrotoluene, and arsenic. Results of recent sampling indicate that these contaminants are not present in soil above human health or ecological risk levels.

A ROD has been completed. There will be no further response for soils. However, groundwater will be monitored for an estimated 104 years. Response completion estimated in 2110. LUCs are required at this site.

Site LCAAP-005 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-000 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. The ROD requires monitored natural attenuation for an estimated 104 years, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs). Area 05 has no further response for soils. Response completion estimated in 2110. LUCs are required at this site. This site is currently in the RA(O) phase.

CLEANUP/EXIT STRATEGY

Groundwater will be monitored for an estimated 96 years. Response completion estimated in 2110. LUCs are required at this site for sitewide groundwater.

Site ID: LCAAP-006

Site Name: AREA 6 - BUILDING 65 IMPOUNDMENT

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Explosives, Metals, Perchlorate

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 6 is located in the central portion of the installation northeast of the fuse line area. There is one lagoon in Area 6 which was used to dispose of wastewater from the load, assemble, and pack (LAP) activities for 20mm ammunition. In 1990 it was removed under an approved Missouri Department of Natural resources (MDNR) closure. A post-closure plan (MDNR, 1985, July 24, 1985, Letter regarding LCAAP Partial Closure Plan; approved with modification for Building 139 & 1,2,3,4 and Building 83 & 1,2,3.) included post-closure care and groundwater monitoring requirements.

The primary contaminants of interest at Area 6 are arsenic, chromium, perchlorate, and RDX. The results of all sampling (found in the Final IWOU RI/FS for Area 6, August 2006) indicate that the soil or groundwater does not contain these contaminants at levels that are above human health or ecological risk levels. Controls will be necessary to ensure that land and resource use remain consistent with the assumptions used to evaluate potential risk.

Site LCAAP-006 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-006 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site Name: AREA 7 - IND. WASTEWATER LAGOON AREA

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Explosives, Metals

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	201409

RIP Date: 200709

RC Date: 201409

SITE DESCRIPTION

Area 7 is located in the center of the Installation, to the north of Ditch A. Nine unlined lagoons were used as settling basins for "finished" wastewater from the IWTP. The northern-most set of 3 lagoons became inactive and was covered in 1952 but was never remediated. The two remaining sets of 3 lagoons were RCRA-closed in 1989. A postclosure plan included post-closure care and groundwater monitoring requirements. One set of closed lagoons was retrofitted with double liners and a leachate collection system that currently accepts finished wastewater from the IWTP.

The primary contaminants of interest at Area 7 are antimony, arsenic, barium, cadmium, chromium, copper, lead, selenium, zinc, TCE, tetrachloroethene (PCE), dichloromethane, RDX, 2,4-dinitrotoluene, aroclor 1260, vinyl chloride, perchlorate, manganese, iron, and 2-nitrotoluene. Area 7 was part of the Inactive Sumps Removal Action which included removal of sumps and surface soil associated with VOC, explosive, and metal contamination in this Area. Results of recent sampling indicate that these contaminants of interest are not present in soil above human health or ecological risk levels.

A ROD has been completed. There will be no further response for soils. However, groundwater will be sampled for an estimated 1 year. LUCs are required at this site.

Site LCAAP-007 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-000 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. The ROD requires monitored natural attenuation for an estimated 4 years, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs). Area 07 has no further response for soils.

Following the Second Five-Year Review, timeframes for Area 7 were estimated to conclude prior to the next five year review, scheduled for 2015. A review of these areas indicates that Area 7 currently contains one monitoring well with COC concentrations above the groundwater CUG. A linear regression analysis was performed for these wells to reevaluate the projected remedial timeframe for groundwater CUGs to be achieved.

CLEANUP/EXIT STRATEGY

Groundwater will be monitored for an estimated 1 year. Response completion estimated in 2014. LUCs are required at this site for

Site ID: LCAAP-007

Site Name: AREA 7 - IND. WASTEWATER LAGOON AREA

sitewide groundwater.

Site ID: LCAAP-008

Site Name: AREA 8 - SOLID WASTE LANDFILL

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Metals, Radionuclides, Semi-volatiles (SVOC), Volatiles (VOC)

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 8 covers approximately 45 acres in the southwest corner of the installation. Consists of 8A (four cells, closed in 1989), 8B (one cell), 8C (two cells, closed in 1971), 8D (Four earth pits 8A (two cells, closed in 1971), 8E (eight trenches, closed 1989), and 8F (four cells closed 2008). All cells are no further action for soil or groundwater per the ROD (January 2008).

The primary contaminants of interest at Area 8 are uranium, manganese, antimony, arsenic, beryllium, cadmium, chromium, lead, silver, thallium, zinc, dichloromethane, and 2,6-dinitrotoluene. The results of recent sampling indicate that the soil or groundwater does not contain these contaminants at levels that are above human health or ecological risk levels. Controls will be necessary to ensure that land and resource use remain consistent with the assumptions used to evaluate potential risk.

A ROD has been completed. There is no further CERCLA response at this site. LUCs are required at this site.

Site LCAAP-008 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-008 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site Name: AREA 9 - BUILDING 60 TREATMENT FACILITY

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Metals

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200609.....	200705
RA(C).....	200705.....	200709
RA(O).....	200709.....	204309

RIP Date: 200709

RC Date: 204309

SITE DESCRIPTION

Area 9 is located in the northeast portion of the Installation directly south of Area 18. Previous activities at Area 9 included charging and loading of small caliber ammunition, case and bullet manufacture, tracer charging, and metal plating. Building 60 was associated with the treatment of cyanide and mercurous nitrate wastes. This Area contains five in-ground tanks for treatment of mercurous nitrate generated from crack testing of small arms cartridges. The tanks in the Mercurous Nitrate Storage Area near Building 60 will be closed in accordance with RCRA guidance as part of the CERCLA process. This Area also contains a sludge drying bed for zinc cyanide sludge generated from chromiumping of steel cartridge cases.

The primary contaminants of concern at Area 9 are TCE and lead. Area 9 was part of the Inactive Sumps Removal Action, which included removal of sumps and surface soil associated with VOC and SVOC contamination in this Area.

Contaminated soil was removed in 2007. The mercurous nitrate tanks and associated piping will be closed and the groundwater will be sampled. Post-closure and verification monitoring of groundwater will be completed. According to the IWOU RD/RAWP, sampling for a monitoring well is to be suspended if no detections above groundwater cleanup goals (CUGs) are observed following three consecutive years in a downgradient well. At that time, sampling is to be discontinued in upgradient wells associated with the same unit. Wells upgradient of a RCRA unit will continue to be sampled annually (even if three consecutive years of no detections above CUGs are observed) until all downgradient wells associated with that specific RCRA unit have met the CUGs for three consecutive years. If concentrations above area-specific CUGs continue to increase for three consecutive rounds, the monitoring program will be reevaluated to determine the appropriate response action. Post-closure and verification monitoring of groundwater will be completed for an additional 30 years (due to showing 30 year forecast here). Response Completion estimated in 2043.

Site LCAAP-009 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-09 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU.

CLEANUP/EXIT STRATEGY

Post-closure and verification monitoring of groundwater will be completed. Sampling is to be suspended if no detections above

Site ID: LCAAP-009

Site Name: AREA 9 - BUILDING 60 TREATMENT FACILITY

groundwater cleanup goals (CUGs) are observed following three consecutive years in a downgradient well. At that time, sampling is to be discontinued in upgradient wells associated with the same unit. Wells upgradient of a RCRA unit will continue to be sampled annually (even if three consecutive years of no detections above CUGs are observed) until all downgradient wells associated with that specific RCRA unit have met the CUGs for three consecutive years. If concentrations above area-specific CUGs continue to increase for three consecutive rounds, the monitoring program will be reevaluated to determine the appropriate response action. Post-closure and verification monitoring of groundwater will be completed for an additional 30 years (due to showing 30 year forecast in MFR). Response Completion estimated in 2043.

Site ID: LCAAP-010

Site Name: AREA 10 - FIRING RANGE WASTE DUMP

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Metals, Radionuclides

Media of Concern: Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	200711.....	200909
IRA.....	200310.....	200909
LTM.....	200909.....	204309

RIP Date: N/A

RC Date: 200909

SITE DESCRIPTION

Area 10, known generically as the Sand Piles, contains waste sand from the backstops at the outdoor firing range. Ammunition produced at the Plant (and additional quality control rounds) is fired into sand backstops. During the 1960's, depleted uranium rounds were demilitarized by firing them into a sand backstop. From the early 1950's through the late 1970's, sand and bullet material were periodically removed from the backstops and disposed of in Area 10. The debris from the depleted uranium (DU) demilitarization effort was included in the material disposed of in Area 10.

In 1994, 2000 and 2004 several sampling events to identify nature and extent of contamination were conducted. Based on field investigations, there was a partial remediation of Area 10 in 1998 as a license decommissioning effort under the NRC's oversight. In 2001, the NRC deferred Area 10 to EPA to facilitate remediation. Lead, MEC and DU are the contaminants of concern. In February of 2005 additional testing was performed for treatability and MEC identification purposes. In October of 2005 an EE/CA was developed. Prior to implementation of the removal action, Area 10 was designated as a separate operable unit from IWOU and the decision was made that an RI/FS resulting in a final remedial action was needed. In May of 2007 the RI was temporarily suspended until after the removal action was completed.

A Removal Action was started in March of 2008 and completed in December 2008. The contaminants of concern are lead and depleted uranium. Actions are projected to include Land Use Controls under LTM. A ROD has been completed in December 2010. A vegetative cover has been placed over contaminated soil. LUCs are required at this site.

Site LCAAP-010 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-010 is included in the Area 10 Operable Unit and the final selected remedy for the site was included in the December 2010 Final Record of Decision (ROD) for Area 10. The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for restrict land use. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-011

Site Name: AREA 11 - BURNING GROUND

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Explosives, Perchlorate

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200607
RD.....	200607.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	205609

RIP Date: 200709

RC Date: 205609

SITE DESCRIPTION

The Area 11 Burning Grounds covers an area of approximately 0.7 acres and is located in the southeastern corner of the NECOU. Beginning in 1957, this area was used for the open burning and open detonation of propellant, explosive, and pyrotechnic materials produced at LCAAP that either do not comply with specifications or surpass the prescribed shelf-life. The soils in Area 11 were RCRA-closed in 1985 when six burn pads were installed on the site. Since 1985, burning has been conducted on burning pads and the ash has been containerized in drums for disposal off-site as hazardous waste.

Historically, Area 11 was identified as a potential source of perchlorate and explosives contamination. No exceedances of the PRGs for Industrial Soil were observed for either perchlorate or explosives.

Both perchlorate and cyclonite (RDX) have been detected in groundwater samples collected from monitoring wells associated with the Area 11 Burning Grounds. RDX is delineated and limited in extent to the area immediately downgradient of the Area 11 Burning Grounds.

Historical analytical data collected from Area 11 monitoring wells indicates that concentrations of these contaminants are declining.

A ROD has been completed. There is no further response for soil. MNA groundwater sampling will be completed for an estimated 49 years. Response completion estimated in 2056. LUCs are required at this site.

Site LCAAP-011 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-011 is included in the North East Corner Operable Unit and the final selected remedy for the site was included in the June 2007 Final Record of Decision (ROD) for NECOU. The ROD requires injections, and monitoring, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs).

CLEANUP/EXIT STRATEGY

MNA groundwater sampling will be completed for an estimated 42 years. Response completion estimated in 2056. LUCs are required at this site for sitewide groundwater.

Site Name: AREA 12 - LABORATORY WASTE LAGOON

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Volatiles (VOC)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198901.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	203209

RIP Date: 200709

RC Date: 203209

SITE DESCRIPTION

Area 12 is located in the western portion of the Manufacturing Area along the western boundary of the Installation. The Area includes two lagoons used to dispose of liquid wastes from the plant's chemical and metallurgical laboratories located in Building 6. The primary contaminants of interest at Area 12 are arsenic, chromium, TCE, vinyl chloride, 1,1-DCE, dichloromethane, iron, and manganese. Results of recent sampling indicate that these contaminants are not present in soil above human health or ecological risk levels.

A ROD has been completed. There is no further response for soils. Groundwater remediation (in-situ reactive zone) will be followed by MNA and operation of groundwater extraction well. Response completion estimated in 2023.

For management and funding purposes, this site has been consolidated into the PBC (GFPR) under LCAAP-036 thru FY12, therefore the material change difference. Starting in FY13 the funding for this site has been reverted back to this site and will be in the new PBC awarded in September 2012. An Engineer's Estimate has been completed for this site.

Cleanup strategy to include operation and maintenance remedies under the PBC include maintenance of LUCs, In Situ Reactive Zone, MNA, and operation of an extraction well for 17 years. The Phase Schedule is until 2028.

Cleanup strategy to include operation and maintenance remedies under the PBC include maintenance of LUCs and MNA sampling for 17 years. The Phase Schedule is until 2028, therefore 9 years is captured here.

Site LCAAP-012 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-012 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. The ROD requires monitored natural attenuation for an estimated 17 years, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs). Area 12 has no further response for soils. Response completion estimated in 2028. LUCs are required at this site. This site is currently in the RA(O) phase.

CLEANUP/EXIT STRATEGY

Site ID: LCAAP-012

Site Name: AREA 12 - LABORATORY WASTE LAGOON

Cleanup strategy to include operation and maintenance remedies under the PBC include maintenance of LUCs, In Situ Reactive Zone, MNA , and operation of an extraction well for 9 years. Response completion estimated is 2028.

Site Name: AREA 13 - BUILDING #35 DRAINAGE AREA

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Polycyclic Aromatic Hydrocarbons (PAH), Volatiles (VOC)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	209909

RIP Date: 200709

RC Date: 209909

SITE DESCRIPTION

Area 13 is located in the south-central portion of the Installation in the Explosives Area. This Area accepted wash water and wastewater containing sodium dichromate from metal parts manufacturing in Building 35 until 1971. The water emptied directly into a drainage ditch. Most of this Area has been disturbed or removed by construction activities.

The primary contaminants of concern at Area 13 are antimony and lead. Area 13 was part of the Inactive Sumps Removal Action which included removal of sumps and surface soil associated with VOC, PAH, and metal contamination in this Area.

A ROD was completed. Contaminated soil in Area 13 was removed in 2007. MNA sampling of groundwater will be complete for an estimated 98 years. Response completion estimated in 2105. LUCs are required at this site.

For management and funding purposes, this site has been consolidated into the PBC (GFPR) under LCAAP-036 thru FY12, therefore the material change difference. Starting in FY13 the funding for this site has been reverted back to this site and will be in the new PBC awarded in September 2012.

Cleanup strategy to include operation and maintenance remedies under the PBC include maintenance of LUCs and MNA sampling for 98 years. The Phase Schedule is until 2105, Monitoring is 98 years; however, the database will only go to 2099 in the phase schedule in AEDB-R due to the design of the database.

Site LCAAP-013 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-000 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. The ROD requires monitored natural attenuation for an estimated 98 years, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs). Area 13 has no further response for soils. Response completion estimated in 2104. LUCs are required at this site. This site is currently in the RA(O) phase.

CLEANUP/EXIT STRATEGY

Cleanup strategy to include operation and maintenance remedies under the PBC include maintenance of LUCs and MNA sampling for 90 years. Response completion estimated is 2105.

Site ID: LCAAP-014
Site Name: AREA 14 - TANK FARM

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Metals, Volatiles (VOC)

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 14 is located in the north-central portion of the installation and consists of two disposal areas. One area (AOI 14A) contains a burning ground that was used by the installation's fire department to dispose of wooden ammunition boxes. The burning ground operated between 1951 and 1967. The second area (AOI 14B) is a sludge disposal area.

The primary contaminants of interest at Area 14 are arsenic, dichloromethane, iron, and manganese. The results of recent sampling indicated that the soil or groundwater does not contain these contaminants at levels that are above human health or ecological risk levels.

Site LCAAP-014 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-014 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site Name: AREA 15 - TEMPORARY SURFACE IMPOUNDMENT

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Metals, Polycyclic Aromatic Hydrocarbons (PAH)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	204309

RIP Date: 200709

RC Date: 204309

SITE DESCRIPTION

Area 15 is located in the south-central part of the Installation, due east of Area 13. This Area contains a temporary surface impoundment built to temporarily contain wastewater from Buildings 35, 90C and 90D during lift station repairs. The impoundment was constructed in the 1970s and its use was discontinued prior to 1980.

The primary contaminants of interest at Area 15 are nitrobenzene, aroclor 1254, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, antimony, barium, chromium, lead, selenium, and arsenic. A removal action was conducted in 2005 to remove and dispose of RCRA-listed hazardous waste (metals-impacted soil) at Area 15. Results of sampling conducted after completion of this removal as well as recent sampling indicate that these contaminants are not present in soil above human health or ecological risk levels. However, arsenic and benzo(a)pyrene in groundwater will be addressed as part of the site-wide groundwater.

Sump 34BSU1 was left in place due to inaccessibility or current site operations preventing the excavation and removal. Verification sampling in this area from wells situated downgradient from the sump will be performed until the sump is removed. The data will be evaluated to determine increasing/decreasing trends of detections of area-specific contaminants of concern above the cleanup goals. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. There will be no further response for soil or groundwater in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast here) of post-closure sampling will be completed. Additional verification sampling will be completed downgradient of Sump 34BSU1 until it is removed.

Response completion estimated in 2043.

Site LCAAP-015 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-015 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. This site is currently in the RA(O) phase.

CLEANUP/EXIT STRATEGY

Sump 34BSU1 was left in place due to inaccessibility or current site operations preventing the excavation and removal. Verification sampling in this area from wells situated downgradient from the sump will be performed until the sump is removed. The data will

Site ID: LCAAP-015

Site Name: AREA 15 - TEMPORARY SURFACE IMPOUNDMENT

be evaluated to determine increasing/decreasing trends of detections of area-specific contaminants of concern above the cleanup goals. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. There will be no further response for soil or groundwater in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast in MFR) of post-closure sampling will be completed. Additional verification sampling will be completed downgradient of Sump 34BSU1 until it is removed. Response completion estimated in 2043.

Site ID: LCAAP-016

Site Name: AREA 16 - ABANDONED LANDFILL

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Metals, Semi-volatiles (SVOC),
Volatiles (VOC)

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200409
IRA.....	199708.....	200506
RA(C).....	200506.....	200709
RA(O).....	200506.....	207709

RIP Date: 200709

RC Date: 207809

SITE DESCRIPTION

This area contains the following Solid Waste Management Units:

1. An open burning ground which was operated from 1952 through 1957.
2. Several small trenches which received solvents during the 1950s.
3. RCRA A, an area where five above-ground Waste Oil and Solvents tanks were operated from 1980 through 1982.
4. An abandoned solid waste landfill.
5. A pistol range, which the LCAAP security force used from 1952 through 1963.
6. RCRA-B, a drum storage area which operated from 1979 until 1982. The RCRA solvents trenches and the above-ground tanks staging areas are both collocated RCRA Sites that are being addressed as part of the CERCLA Program per the FFA.

Area 16A Abandoned Landfill (ABLF) covers approximately 9 acres. Landfilling operations in the ABLF began in this general area in 1950. It was used for disposal of industrial material such as industrial wastewater treatment plant grease and oil, waste contaminated with explosives, and fly ash from demilitarization operations. The landfill ceased operations in the late 1970s. Leachate from the landfill was collected by a leachate collection system installed in 2005 and taken to Building 163 for treatment. Recent leachate samples do not contain chemicals that exceed cleanup goals. Construction of permeable reactive barrier was completed. VOCs, SVOCs, explosives, and metals have been identified as potential constituents of concern for soil in the Area 16A ABLF.

Results of the RI activities indicate concentrations of these constituents are below applicable screening levels or not associated with the Area 16A ABLF. Groundwater data indicates intermittent detections of VOCs and more consistent detections of SVOCs. Bis-2- ethyl(hexyl)phthalate and 1,4-dioxane are the two SVOCs that exceed the groundwater cleanup goals in this area.

The Area 16B Solvent Pits consist of five pits located west of the Area 16A ABLF (approximately 1.2 acres). The Area 16B Solvent Pits actively received solvent waste in the 1950s but were closed prior to 1957. Trichloroethene, cis-1,2-dichloroethene, and vinyl chloride have been detected at concentrations that exceeded PRGs for soil. The most predominant VOCs in the groundwater plume extending from the Area 16B Solvent Pits are cis-1,2-dichloroethene and vinyl chloride. Concentrations of these constituents were highest within the source area, and provide evidence that extensive degradation of trichloroethene has been occurring. Benzene, ethylbenzene, and toluene are also present in the source area, indicating a continuing source of carbon for chlorinated ethene degradation. Concentrations of petroleum hydrocarbons in groundwater are limited in extent to the source area. Chlorinated VOCs in groundwater extend from the Area 16B Solvent Pits to the north to the boundary of the paleochannel.

A ROD has been completed for this site. Area 16A (ABLF) will require MNA of VOCs and SVOCs for an estimated 13 years. Area 16B will require enhanced reductive dechlorination and MNA for an estimated 71 years. Lead impacted soils in 16C and 16D were excavated and consolidated in 17D area. Response completion is estimated in 2077. LUCs are required at this site.

Site ID: LCAAP-016

Site Name: AREA 16 - ABANDONED LANDFILL

Site LCAAP-016 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-016 is included in the North East Corner Operable Unit and the final selected remedy for the site was included in the June 2007 Final Record of Decision (ROD) for NECOU. The ROD requires injections, and monitoring, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs).

CLEANUP/EXIT STRATEGY

Area 16A (ABLF) will require MNA of VOCs and SVOCs for an estimated 13 years. Area 16B will require enhanced reductive dechlorination and MNA for an estimated 71 years. Lead impacted soils in 16C and 16D were excavated and consolidated in 17D area. Response completion is estimated in 2077. LUCs are required at this site for groundwater and restriction.

Site Name: AREA 17-SANITARY LANDFILL & SOLVENT PITS

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Dense nonaqueous phase liquid (DNAPL), Light non-aqueous phase liquids (LNAPL), Metals, Semi-volatiles (SVOC), Volatiles (VOC)

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200505
RD.....	200308.....	200509
IRA.....	199708.....	200309
RA(C).....	200309.....	200709
RA(O).....	200709.....	209909

RIP Date: 200709

RC Date: 209909

SITE DESCRIPTION

This area contains the following Solid Waste Management Units:

1. A currently permitted Sanitary Landfill which has operated from 1980 to mid-1990s.
2. Three Oil & Solvents Pits which received IWTP oil and grease, waste solvents, and waste oil from 1960 until 1979.
3. An area where Waste Glass, Paint, and Solvents were buried in shallow pits and a stream bed. This area was active from 1960 through 1970.
4. An open burning pad which operated for a short time during 1975.
5. A pistol range, which is currently used by the LCAAP security force. It has been in use since 1979.

The Area 17B Oil and Solvent Pits consisted of three pits located adjacent to the Area 17A Sanitary Landfill. The pits were used for disposal of industrial waste treatment plant grease and oil, waste solvents, and waste oils, demolition waste, waste transite, and plant refuse. The soil cover was constructed over the central and western pit in October 2000.

In soil, the COCs for Area 17B include PAHs and VOCs. The PAHs of concern, based on soil direct contact risk, consist of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene. Because of the presence of the vegetative cover, the pathway for direct contact risk to COCs in surficial soil has been removed. In groundwater, the COCs for Area 17B include VOCs, SVOCs, and metals. The primary COCs for groundwater are cis-1,2-dichloroethene, trichloroethene, and vinyl chloride. The central and western pits contain NAPL, a mixture of petroleum hydrocarbons and chlorinated solvents that was disposed of in the 1960s and 1970s. NAPL has not been observed to be significantly mobile in the subsurface with only a single well installed in the pits containing measurable NAPL.

The Area 17D Waste, Glass, Paint, and Solvent (WGPS) Area is located in the NECOU southwest of the Area 17B Oil and Solvent Pits. The Area 17D WGPS was used for a variety of waste disposal activities from 1960 to 1975. Previous investigations have indicated the presence of a pit with high levels of VOCs, which is a likely source area for soil and groundwater contamination. The selected remedy for the Area 17DWGPS component of the 1998 Interim Remedial Action ROD was the installation of a subsurface permeable reactive wall (PRW) to treat dissolved-phase constituents emanating from the WGPS area. The PRW was installed during the summer of 2000.

In surficial soil, Area 17D contains concentrations of lead that exceed the preliminary remediation goals (PRG). In groundwater, the chemicals of concern for Area 17D include VOCs and metals. The primary chemicals of concern for groundwater are cis-1,2-dichloroethene, trichloroethene, and vinyl chloride. Concentrations of these compounds are higher on the upgradient side of the PRW, which indicates that degradation of these constituents is occurring as groundwater flows through the wall.

Site ID: LCAAP-017

Site Name: AREA 17-SANITARY LANDFILL & SOLVENT PITS

A ROD has been completed for this site. Lead impacted soils in Area 17C have been excavated and placed under a vegetative cover in Area 17D. Area 17B required ZVI treatment of source area, ERD and MNA of VOC plume indefinitely (ROD 102 years, 5 yr review 125 yrs). Area 17D required excavation and consolidation of lead impacted soils under a vegetative cover, maintenance of PRW, installation of phyto-system, and ERD and MNA for VOCs in groundwater indefinitely (ROD 15 years). Response completion estimated in 2132. LUCs are required at this site.

LCAAP-017 is included in the North East Corner Operable Unit and the final selected remedy for the site was included in the June 2007 Final Record of Decision (ROD) for NECOU. The ROD requires injections, and monitoring, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs).

CLEANUP/EXIT STRATEGY

Cleanup strategy to include operation and maintenance remedies under the PBC include maintenance of LUCs, In Situ Reactive Zone, MNA, and operation of extraction wells for 118 years. Response completion estimated is 2132.

Site Name: AREA 18-BURNING PITS, LAGOONS & TRE

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Dense nonaqueous phase liquid (DNAPL), Light non-aqueous phase liquids (LNAPL), Metals, Polychlorinated Biphenyls (PCB), Semi-volatiles (SVOC), Volatiles (VOC)

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200408
RD.....	199706.....	200409
IRA.....	199307.....	200803
RA(C).....	200309.....	200803
RA(O).....	200309.....	207309

RIP Date: 200803

RC Date: 207309

SITE DESCRIPTION

This area contains the following Solid Waste Management Units:

1. A central area of eight burn pits located along Ditch B. The pits were used to burn Plant construction debris and solvents. The pits were operated from 1952 through 1975.
2. Surrounding the central burn pit area are 15 smaller pits, trenches, and lagoons which accepted solvents, IWTP oil and grease, and other Plant-generated industrial wastes. These pits were used intermittently from 1952 through 1975.
3. Lead-containing material has been spread in a thin layer over the ground in the area of the pits. This activity is believed to have been part of the pit capping operations taking place during 1975. A Record of Decision (ROD) for Area 18 OU was prepared and finalized in 1999. The ROD identified a remedy involving shallow groundwater extraction wells, soil vapor extraction/multiphase extraction, pump and treat for deep groundwater, excavation and disposal of leadcontaminated soil, vegetative cover, institutional controls, and long-term monitoring. During the pre-design investigations conducted in 2000, the Army discovered that the extent of soil contamination and source area impacts were greater than it previously believed, warranting a reevaluation of the remedy selected for the source area and surface soil at Area 18 OU. The remedy relating to OU-wide groundwater is not affected and the Army is not making any changes to the groundwater components of the 1999 selected remedy, including continued operation of the extraction system, as specified in the 1999 ROD.

A ROD addendum (2007) has been completed for this site. The remedy includes a vegetative cover, in-situ stabilization, and institutional controls for surficial soil; focused soil excavation and product recovery within the source area followed by in-situ source area treatment via IRZ; in-situ treatment in the paleochannel downgradient of the source area; a vegetative cover in the source area; and institutional controls in the source area and paleochannel groundwater. Response completion estimated in 2073. LUCs are required at this site.

Operations of the IRA (Building 163) will remain with the Facility Use Contractor (currently ATK). Site LCAAP-018 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-018 is included in the Area 18 Operable Unit and the final selected remedy for the site was included in the September 2007 Final Record of Decision (ROD) for Area 18. The ROD requires injections, air stripping (pump and treat), and monitoring, tracked under the remedial action (operations) phase, for groundwater and land use controls (LUCs).

Site ID: LCAAP-018

Site Name: AREA 18-BURNING PITS, LAGOONS & TRE

CLEANUP/EXIT STRATEGY

Cleanup strategy to include in-situ source area treatment via IRZ; in-situ treatment in the paleochannel downgradient of the source area; a vegetative cover in the source area; and institutional controls in the source area and paleochannel groundwater. Response completion estimated in 2073. LUCs are required at this site for groundwater and restriction.

Site ID: LCAAP-019

Site Name: AREA 19 - BUILDING 1 VICINITY

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Volatiles (VOC)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	204309

RIP Date: 200709

RC Date: 204309

SITE DESCRIPTION

Area 19 is located in the north-central portion of the Manufacturing Area, next to Area 7. This Area comprises the grounds around and adjacent to active Building 1 where several sumps were previously located.

The primary contaminants of interest at Area 19 are aroclor 1260, nitrobenzene, benzo(a)pyrene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, 1,1-DCE, TCE, and vinyl chloride. Area 19 was part of the Inactive Sumps Removal Action which included removal of sumps and surface soil associated with PAH and explosive contamination in this Area. Results of recent sampling indicate that these contaminants of interest are not present in soil or groundwater above human health or ecological risk levels.

A ROD is complete. There will be no response for soil or groundwater at this Area however to ensure that sumps are not a continued source to groundwater, verification sampling will be conducted until sump can be removed. LUCs are required at this site.

Sump 1SU2 was left in place due to inaccessibility or current site operations preventing the excavation and removal. Verification sampling in this area from wells situated downgradient from the sump will be performed until the sump is removed. The data will be evaluated to determine increasing/decreasing trends of detections of area-specific contaminants of concern above the cleanup goals. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. There will be no further response for soil or groundwater in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast here) of post-closure sampling will be completed. Additional verification sampling will be completed downgradient of Sump 1SU2 until it is removed. Response completion estimated in 2043.

Site LCAAP-019 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-019 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. This site is currently in the RA(O) phase.

CLEANUP/EXIT STRATEGY

Sump 1SU2 was left in place due to inaccessibility or current site operations preventing the excavation and removal. Verification sampling in this area from wells situated downgradient from

Site ID: LCAAP-019
Site Name: AREA 19 - BUILDING 1 VICINITY

the sump will be performed until the sump is removed. The data will be evaluated to determine increasing/decreasing trends of detections of area-specific contaminants of concern above the cleanup goals. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. There will be no further response for soil or groundwater in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast here) of post-closure sampling will be completed. Additional verification sampling will be completed downgradient of Sump 1SU2 until it is removed. Response completion estimated in 2043.

Site ID: LCAAP-020

Site Name: AREA 20 - BUILDING 2 VICINITY

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Volatiles (VOC)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	201609

RIP Date: 200709

RC Date: 201609

SITE DESCRIPTION

comprises the grounds around and adjacent to active Building 2. An area southeast of the building was identified on aerial photographs as potentially containing buried waste materials. The specific character, age, or quantities of the potential wastes are unknown. Solvents were reported spilled in an area south of Building 14 (garage). The date of the spill and the quantity of material spilled is unknown.

The primary contaminants of interest at Area 20 are arsenic, nitrobenzene, PCE, and carbon tetrachloride. The results of recent sampling indicate that the soil or groundwater does not contain these contaminants at levels that are above human health or ecological risk levels.

A ROD has been completed. There will be no response for soil at this area; however, because carbon tetrachloride in the groundwater exceeds the maximum contaminant level (MCL) at Area 20 therefore, groundwater will be monitored for an estimated 5 years. Response completion estimated in 2016. LUCs are required at this site.

Site LCAAP-020 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-20 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU.

Following the Second Five-Year Review, timeframes for Area 20 were estimated to conclude prior to the next five year review, scheduled for 2015. A review of these areas indicates that each of these three AOCs currently contains one monitoring well with COC concentrations above the groundwater CUG. A linear regression analysis was performed for these wells to reevaluate the projected remedial timeframe for groundwater CUGs to be achieved.

CLEANUP/EXIT STRATEGY

MNA groundwater sampling will be completed for an estimated 2 years. Response completion estimated in 2016. LUCs are required at this site for sitewide groundwater.

Site ID: LCAAP-021

Site Name: AREA 21 - BUILDING 3 VICINITY

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Polycyclic Aromatic Hydrocarbons (PAH)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	204309

RIP Date: 200709

RC Date: 204309

SITE DESCRIPTION

Area 21 is located in the north-central portion of the Installation in the Manufacturing Area. This Area comprises the grounds around and adjacent to active Building 3. This Area also includes Buildings 3A and 12A, which were used during the 1960s for the machining and assembly of Depleted Uranium-containing 50 caliber and 20 millimeter ammunition. Buildings 3A and 12A were decontaminated during 1985 and 1986. Subsequent inspection by the Nuclear Regulatory Commission indicated that additional cleanup activities were required for Building 3A. In July 2001, the Army conducted a removal action to demolish and dispose of contaminated debris from Building 3A. In addition, three sumps were removed and disposed of at a permitted disposal facility.

The primary contaminants of interest at Area 21 are arsenic, chromium, lead, barium, silver, antimony, aroclor 1254, 2,4-dinitrotoluene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3- cd)pyrene, RDX, TCE, vinyl chloride, and perchlorate. Area 21 was part of the Inactive Sumps Removal Action which included removal of sumps and surface soil associated with PAH and perchlorate contamination in this Area. Results of recent sampling indicate that these contaminants are not present in soil or groundwater above human health or ecological risk levels.

Sump 3SU3 was left in place due to inaccessibility or current site operations preventing the excavation and removal. Verification sampling in this area from wells situated downgradient from the sump will be performed until the sump is removed. The data will be evaluated to determine increasing/decreasing trends of detections of area-specific contaminants of concern above the cleanup goals. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. There will be no further response for soil or groundwater in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast here) of post-closure sampling will be completed. Additional verification sampling will be completed downgradient of Sump 3SU3 until it is removed. Response completion estimated in 2043.

Site LCAAP-021 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-021 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. This site is currently in the RA(O) phase.

Site ID: LCAAP-021

Site Name: AREA 21 - BUILDING 3 VICINITY

CLEANUP/EXIT STRATEGY

Sump 3SU3 was left in place due to inaccessibility or current site operations preventing the excavation and removal. Verification sampling in this area from wells situated downgradient from the sump will be performed until the sump is removed. The data will be evaluated to determine increasing/decreasing trends of detections of area-specific contaminants of concern above the cleanup goals. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. There will be no further response for soil or groundwater in this Area however in order to satisfy the groundwater corrective actions per FFA, 30 years (due to showing 30 year forecast here) of post-closure sampling will be completed. Additional verification sampling will be completed downgradient of Sump 3SU3 until it is removed. Response completion estimated in 2043.

Site Name: AREA 22 - DEMOLITION-WASTE DUMP

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Metals

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 22 is located in the north-central portion of the installation at the northern end of Owens-Schoolhouse Road along the northern boundary of the installation. This area contains a demolition waste dump that is thought to have been active during the 1940s and, perhaps, in the early-1950s. The exact operating dates and the characteristics of the wastes the dump received are unknown. The primary contaminants of interest at Area 22 are arsenic, cadmium, lead, and bis(2-ethylhexyl)phthalate. The results of recent sampling indicate that the soil or groundwater does not contain these contaminants at levels that are above human health or ecological risk levels. Site LCAAP-022 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-022 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-023

Site Name: AREA 23 - SLUDGE BURIAL PITS

STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Metals

Media of Concern: Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 23 is located in the center of the installation south of Ditch A. The area contains buildings that house bulk propellant or gunpowder, which were used throughout the manufacturing area. AOI 23A is an area of suspected IWTP sludge burial. This area is thought to contain four IWTP sludge burial pits. The pits were reportedly operated during the mid-1960s and ceased operation in 1967.

Environmental investigations have uncovered no evidence of buried waste in this area; however, manganese above human health risk levels is present in the soil.

Site LCAAP-023 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-023 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site Name: AREA 24-SANITARY WASTEWATER TRTMNT

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Volatiles (VOC)

Media of Concern: Groundwater

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	200909
LTM.....	200909.....	204309

RIP Date: 200709

RC Date: 200909

SITE DESCRIPTION

Area 24 is located north of Area 8 and west of Area 7 in the west-central portion of the installation. This area is the site of the now-inactive Sanitary Wastewater Treatment Plant which operated from 1941 until the industrial wastewater and sanitary wastewater streams were combined to go to the Little Blue Valley Sewer District in 1990.

The primary contaminants of interest at Area 24 are arsenic, chromium, PCE, TCE, cis-1,2-DCE, and vinyl chloride. Results of recent sampling indicate that the soil does not contain these contaminants at levels that are above human health or ecological risk levels; however, PCE and vinyl chloride are present in groundwater above health risk levels.

A ROD has been completed. There will be no further response for soils. MNA groundwater sampling will be conducted. LUCs are required at this site.

Site LCAAP-024 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-24 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU.

Following the Second Five-Year Review, timeframes for Area 24 were estimated to conclude prior to the next five year review, scheduled for 2015. A review of these areas indicates that each of these three AOCs currently contains one monitoring well with COC concentrations above the groundwater CUG. A linear regression analysis was performed for these wells to reevaluate the projected remedial timeframe for groundwater CUGs to be achieved.

For Area 24, COC trends were not significantly decreasing or increasing and a timeframe could not be projected. COC concentrations at well 24MW001 will continue to be monitored for declining trends. As presented in the IWOU RD/RAWP (ARCADIS 2008), the following criterion will be used to assess whether CUGs have been attained at a particular Objective 1 monitoring location: ¿¿four consecutive sampling rounds resulting in COC concentrations below cleanup goals spanning a minimum of 2 years will indicate that cleanup goals have been achieved for a particular location.¿

CLEANUP/EXIT STRATEGY

Groundwater sampling will be completed for four consecutive sampling rounds resulting in COC concentrations below cleanup goals spanning a minimum of 2 years will indicate that cleanup goals have been achieved for a particular location. Response completion estimated in 2043. LUCs are required at this site for sitewide groundwater.

Site ID: LCAAP-025

Site Name: AREA 25 - DEMOLITION WASTE DUMP

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Asbestos

Media of Concern: Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 25 is located in the western portion of the installation just south of the Big Ditch and adjacent to the western Installation boundary. This area contains a disposal area that received transite asbestos wastes from Installation construction activities. The transite material was spread out on the ground and was put into a ditch at the dump location. The date when the material was disposed of is unknown.

In 2005 a removal action was conducted to remove asbestos at Area 25. The results of sampling conducted after completion of this removal indicate that these contaminants are not present above screening levels in the soil.

Site LCAAP-025 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-025 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-026

Site Name: AREA 26 - DEMOLITION DUMP

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Polycyclic Aromatic Hydrocarbons (PAH)

Media of Concern: Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 26 is located in the south-central portion of the facility, adjacent to the southern property boundary. This area contains a disposal area that received roofing material from Installation construction activities. The history of the site is largely unknown. The roofing materials waste disposal area is located on the east side of the access road, 150 yards from the intersection of the access road with the south perimeter road. The waste consisted of mounds of tar-like material interspersed with a covering of coarse-grained sand and fine gravel.

In 2005 a removal action was conducted to remove waste material at Area 26. The results of sampling conducted after completion of this removal indicate that these contaminants are not present above screening levels in the soil.

Site LCAAP-026 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-026 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-028

Site Name: AREA 28 - PIPELINE LEAKS

STATUS

Regulatory Driver: CERCLA

RRSE: NOT EVALUATED

Contaminants of Concern: Volatiles (VOC)

Media of Concern: Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 28 encompasses a pipeline leak that was reported to have occurred during the 1950s. The pipeline runs from the northeast to the southwest in the southeast corner of the installation. The primary contaminant of interest at Area 28 is benzene. The results of recent sampling indicate that the soil does not contain this contaminant at a level that is above human health or ecological risk levels.

Site LCAAP-028 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-028 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-029

Site Name: AREA 29 - WESTERN BORDER DUMPS

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Metals

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 29 is located along the western side of the facility next to State Highway 7. This area contains two dumps situated along the western boundary of the installation. The northern dump reportedly received debris from the original installation construction activities in the 1940s. The southern dump was used during construction of the Big Ditch (between 1984 and 1987).

The primary contaminants of interest at Area 29 are chromium, beryllium, arsenic, iron, and manganese. The results of recent sampling indicate that the soil or groundwater does not contain these contaminants at levels that are above human health or ecological risk levels.

Site LCAAP-029 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-029 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-030

Site Name: AREA 30 - BURNING PITS ASH DISPOSAL

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Metals

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
RD.....	200608.....	200705
RA(C).....	200309.....	200709
RA(O).....	200709.....	200909
LTM.....	200910.....	204309

RIP Date: 200709

RC Date: 200909

SITE DESCRIPTION

Area 30 is located due north of Building 5, adjacent to the northern Installation boundary, and west of Area 14. This Area was used by the Installation Fire Department to burn wooden ammunition boxes from 1951 to 1967. The Area has also been used to dispose of burning ground fly ash, and disposal of laboratory glassware and other lab related waste.

The primary contaminant of concern at Area 30 is lead. Lead is present in soil at Area 30 above the riskbased action level of 1,197 mg/kg. A ROD has been completed in January 2008. A vegetative cover has been placed over contaminated soil. Although chemicals are not present in groundwater at Area 30 that present a potentially unacceptable risk, groundwater was to be monitored for 2 years to ensure that waste did not impact groundwater. Following two consecutive sample events resulting in concentrations less than cleanup goals, sampling will be discontinued. The results from the 2008 and 2009 annual sampling events in Area 30 indicated that COCs were below cleanup goals and, therefore, no further verification sampling is required. As shown in the 2012 O & M Report, verification monitoring in Area 30 was discontinued in 2010, because results from the 2008 and 2009 annual sampling events indicated that COCs were below CUGs and, therefore, no further verification sampling was required. A confirmation sample collected during 2012 from these wells also showed no exceedance of CUGs.

Site LCAAP-030 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-030 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU. The ROD required operation and maintenance, tracked under the remedial action (operations) (RAO) phase, for groundwater and land use controls (LUCs), but has since been placed into Long Term Monitoring.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected (vegetative cover) and maintained for LUCs.

Site ID: LCAAP-031

Site Name: AREA 31 - FIREBREAK LANDFILLS

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Metals

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 31 is located in the northeast portion of the facility just south of the Perimeter North Road. This area contains the remnants of two shallow open pit dumps. The waste is assorted household debris, empty drums, and empty ammunition boxes. There is also evidence of some burning in the area. The area was probably sporadically active between the 1940s and 1960s. Some material also may have been added after that time.

In 2005 and 2006 a removal action was conducted to remove the waste material at this area. The results of sampling conducted after completion of this removal indicate that these contaminants are not present above screening levels in the soil.

Site LCAAP-031 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-031 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-032

Site Name: AREA 32 - HOUSE BASEMENT

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Metals

Media of Concern: Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 32 is scattered throughout the eastern wooded area of the installation are the remnants of several houses that were there prior to 1940 when the installation was founded. A survey of the area revealed five intact houses or house basements. One of the basements contained empty drums and a tar-like residue. Another one had a domestic waste dump adjacent to the foundation.

The primary contaminants of interest at Area 32 are arsenic, chromium, and lead. The results of recent sampling indicate that the soil does not contain these contaminants at levels that are above human health or ecological risk levels.

Site LCAAP-032 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-032 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-033

Site Name: Area 33 - Blending Pelletizing

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Explosives, Metals, Semi-volatiles (SVOC), Volatiles (VOC)

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

deflector berms. Some of these structures were used in powder pouring operations, which were conducted to scale down bulk quantities of propellant.

The primary contaminants of interest at Area 33 are Arsenic, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenze(a,h)anthracene, indeno(1,2,3-cd)pyrene, carbazole, nitrobenzene, and n-nitrosodiphenylamine, iron, manganese, and RDX. The results of recent sampling indicate that neither the soil nor groundwater contains these contaminants at levels that are above human health or ecological risk levels.

Site LCAAP-033 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-033 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-034
Site Name: Area 34, Site Ditches

STATUS

Regulatory Driver: CERCLA

RRSE: LOW

Contaminants of Concern: Explosives

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200608
LTM.....	200709.....	204309

RIP Date: N/A

RC Date: 200608

SITE DESCRIPTION

Area 34 Site Ditches consist of the surface water bodies and drainages across the central and northern portions of the installation. Specifically, Area 34 includes the Ditch A system, which consists of two minor ditches (Ditch 2 and Ditch 3) that flow into Ditch A. Ditch 3 is located on the southern border of Area 12 and Ditch 2 is located in the northwestern portion of Area 7. Also included in this group is the Ditch B system, which consists of all channelized ditches that flow into it.

Ditch A is the channelized remnant of West Fire Prairie Creek. It provides storm water drainage for the western half of the installation. Prior to 1990, Ditch A was the outfall receiver for the IWTP and the sanitary sewage plant. Ditch B is the channelized remnant of East Fire Prairie Creek. It provides storm water drainage for the eastern half of the installation. Ditch B received runoff from the firing range, the Building 139 Manufacturing Area, and from several of the installation's main production and warehouse buildings.

Site LCAAP-034 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-034 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site ID: LCAAP-035

Site Name: AREA 35 -- SUMPS

STATUS

Regulatory Driver: CERCLA

RRSE: HIGH

Contaminants of Concern: Semi-volatiles (SVOC), Volatiles (VOC)

Media of Concern: Groundwater, Soil

Phases	Start	End
PA.....	197906.....	198901
SI.....	197906.....	198901
RI/FS.....	198708.....	200409
IRA.....	200405.....	200609
RA(C).....	200405.....	200609
LTM.....	200609.....	204309

RIP Date: N/A

RC Date: 200609

SITE DESCRIPTION

Area 35 includes 123 sumps that have been identified across the Plant. Of those, 19 are connected to storm sewers, 64 discharge to surface drainage, 27 drain into the Industrial Wastewater System, 4 are pumped regularly, and 5 are under building floors.

The original processes associated with the sumps were related to tracers (34 sumps), primers (34 sumps), igniters (5 sumps), incendiaries (5 sumps), high explosive incendiaries (5 sumps), indoor firing range (15 sumps), maintenance areas (10 sumps), and miscellaneous activities (12 sumps). A Removal Action was completed in 2007.

This site covers the removal action of all inactive sumps except those found within the areas of sites 13 and 15.

A ROD has been completed and contaminated sediments were removed from several ditches. No further response for soil or groundwater is required. LUCs are required at this site.

Site LCAAP-035 was included in a 2003 Performance Based Contract (PBC) that was awarded to Arcadis U.S. Inc. The PBC contract number is DABJ01-03-F-0973 and the period of performance for the PBC was 10 years. On September 14, 2012, the contract was extended (modified) for an additional year; the extension will expire in September 2013. The contract modification is included as an attachment to this MFR. LCAAP-035 is included in the Installation Wide Groundwater Operable Unit (IWOU) and the final selected remedy for the site was included in the January 2008 Final Record of Decision (ROD) for IWOU (attached). The ROD requires no further action, except LUCs.

CLEANUP/EXIT STRATEGY

LUCs are required at this site for site wide groundwater. This site will be inspected and maintained for LUCs.

Site Closeout (No Further Action) Summary

Site ID	Site Name	NFA Date	Documentation
LCAAP-027	AREA 27 - FIRING RANGE	198901	Active ranges are not addressed under CERCLA; they are deferred to MMRP after range closure or transfer.
LCAAP-036	PBC Site at LCAAP	201209	

IRP Schedule

Date of IRP Inception: 197906

Past Phase Completion Milestones

1989

PA (LCAAP-001 - AREA 1 - BUILDING 83 WASTEWATER LAGOONS, LCAAP-002 - AREA 2 - BUILDING 85 WASTEWATER LAGOONS, LCAAP-003 - AREA 3 - SANDPITS, LCAAP-004 - AREA 4 - BUILDING 139 - BACKLINE PONDS, LCAAP-005 - AREA 5 - BUILDING 139 IMPOUNDMENTS, LCAAP-006 - AREA 6 - BUILDING 65 IMPOUNDMENT, LCAAP-007 - AREA 7 - IND. WASTEWATER LAGOON AREA, LCAAP-008 - AREA 8 - SOLID WASTE LANDFILL, LCAAP-009 - AREA 9 - BUILDING 60 TREATMENT FACILITY, LCAAP-010 - AREA 10 - FIRING RANGE WASTE DUMP, LCAAP-011 - AREA 11 - BURNING GROUND, LCAAP-012 - AREA 12 - LABORATORY WASTE LAGOON, LCAAP-013 - AREA 13 - BUILDING #35 DRAINAGE AREA, LCAAP-014 - AREA 14 - TANK FARM, LCAAP-015 - AREA 15 - TEMPORARY SURFACE IMPOUNDMENT, LCAAP-016 - AREA 16 - ABANDONED LANDFILL, LCAAP-017 - AREA 17-SANITARY LANDFILL & SOLVENT PITS, LCAAP-018 - AREA 18-BURNING PITS, LAGOONS & TRE, LCAAP-019 - AREA 19 - BUILDING 1 VICINITY, LCAAP-020 - AREA 20 - BUILDING 2 VICINITY, LCAAP-021 - AREA 21 - BUILDING 3 VICINITY, LCAAP-022 - AREA 22 - DEMOLITION-WASTE DUMP, LCAAP-023 - AREA 23 - SLUDGE BURIAL PITS, LCAAP-024 - AREA 24-SANITARY WASTEWATER TRTMNT , LCAAP-025 - AREA 25 - DEMOLITION WASTE DUMP, LCAAP-026 - AREA 26 - DEMOLITION DUMP, LCAAP-027 - AREA 27 - FIRING RANGE, LCAAP-028 - AREA 28 - PIPELINE LEAKS, LCAAP-029 - AREA 29 - WESTERN BORDER DUMPS, LCAAP-030 - AREA 30 - BURNING PITS ASH DISPOSAL, LCAAP-031 - AREA 31 - FIREBREAK LANDFILLS, LCAAP-032 - AREA 32 - HOUSE BASEMENT, LCAAP-033 - Area 33 - Blending Pelletizing, LCAAP-034 - Area 34, Site Ditches , LCAAP-035 - AREA 35 -- SUMPS, LCAAP-036 - PBC Site at LCAAP)

RI/FS (LCAAP-027 - AREA 27 - FIRING RANGE)

SI (LCAAP-001 - AREA 1 - BUILDING 83 WASTEWATER LAGOONS, LCAAP-002 - AREA 2 - BUILDING 85 WASTEWATER LAGOONS, LCAAP-003 - AREA 3 - SANDPITS, LCAAP-004 - AREA 4 - BUILDING 139 - BACKLINE PONDS, LCAAP-005 - AREA 5 - BUILDING 139 IMPOUNDMENTS, LCAAP-006 - AREA 6 - BUILDING 65 IMPOUNDMENT, LCAAP-007 - AREA 7 - IND. WASTEWATER LAGOON AREA, LCAAP-008 - AREA 8 - SOLID WASTE LANDFILL, LCAAP-009 - AREA 9 - BUILDING 60 TREATMENT FACILITY, LCAAP-010 - AREA 10 - FIRING RANGE WASTE DUMP, LCAAP-011 - AREA 11 - BURNING GROUND, LCAAP-012 - AREA 12 - LABORATORY WASTE LAGOON, LCAAP-013 - AREA 13 - BUILDING #35 DRAINAGE AREA, LCAAP-014 - AREA 14 - TANK FARM, LCAAP-015 - AREA 15 - TEMPORARY SURFACE IMPOUNDMENT, LCAAP-016 - AREA 16 - ABANDONED LANDFILL, LCAAP-017 - AREA 17-SANITARY LANDFILL & SOLVENT PITS, LCAAP-018 - AREA 18-BURNING PITS, LAGOONS & TRE, LCAAP-019 - AREA 19 - BUILDING 1 VICINITY, LCAAP-020 - AREA 20 - BUILDING 2 VICINITY, LCAAP-021 - AREA 21 - BUILDING 3 VICINITY, LCAAP-022 - AREA 22 - DEMOLITION-WASTE DUMP, LCAAP-023 - AREA 23 - SLUDGE BURIAL PITS, LCAAP-024 - AREA 24-SANITARY WASTEWATER TRTMNT , LCAAP-025 - AREA 25 - DEMOLITION WASTE DUMP, LCAAP-026 - AREA 26 - DEMOLITION DUMP, LCAAP-027 - AREA 27 - FIRING RANGE, LCAAP-028 - AREA 28 - PIPELINE LEAKS, LCAAP-029 - AREA 29 - WESTERN BORDER DUMPS, LCAAP-030 - AREA 30 - BURNING PITS ASH DISPOSAL, LCAAP-031 - AREA 31 - FIREBREAK LANDFILLS, LCAAP-032 - AREA 32 - HOUSE BASEMENT, LCAAP-033 - Area 33 - Blending Pelletizing, LCAAP-034 - Area 34, Site Ditches , LCAAP-035 - AREA 35 -- SUMPS)

1990

IRA (LCAAP-002 - AREA 2 - BUILDING 85 WASTEWATER LAGOONS)

2003

IRA (LCAAP-017 - AREA 17-SANITARY LANDFILL & SOLVENT PITS)

2004

RD (LCAAP-018 - AREA 18-BURNING PITS, LAGOONS & TRE)

RI/FS (LCAAP-016 - AREA 16 - ABANDONED LANDFILL, LCAAP-018 - AREA 18-BURNING PITS, LAGOONS & TRE, LCAAP-035 - AREA 35 -- SUMPS)

2005

IRA (LCAAP-016 - AREA 16 - ABANDONED LANDFILL)

RI/FS (LCAAP-017 - AREA 17-SANITARY LANDFILL & SOLVENT PITS)

RD (LCAAP-017 - AREA 17-SANITARY LANDFILL & SOLVENT PITS)

2006

RA(C)

(LCAAP-035 - AREA 35 -- SUMPS)

RI/FS

(LCAAP-001 - AREA 1 - BUILDING 83 WASTEWATER LAGOONS, LCAAP-002 - AREA 2 - BUILDING 85 WASTEWATER LAGOONS, LCAAP-003 - AREA 3 - SANDPITS, LCAAP-004 - AREA 4 - BUILDING 139 - BACKLINE PONDS, LCAAP-005 - AREA 5 - BUILDING 139 IMPOUNDMENTS, LCAAP-006 - AREA 6 - BUILDING 65 IMPOUNDMENT, LCAAP-007 - AREA 7 - IND. WASTEWATER LAGOON AREA, LCAAP-008 - AREA 8 - SOLID WASTE LANDFILL, LCAAP-009 - AREA 9 - BUILDING 60 TREATMENT FACILITY, LCAAP-011 - AREA 11 - BURNING GROUND, LCAAP-012 - AREA 12 - LABORATORY WASTE LAGOON, LCAAP-013 - AREA 13 - BUILDING #35 DRAINAGE AREA, LCAAP-014 - AREA 14 - TANK FARM, LCAAP-015 - AREA 15 - TEMPORARY SURFACE IMPOUNDMENT, LCAAP-019 - AREA 19 - BUILDING 1 VICINITY, LCAAP-020 - AREA 20 - BUILDING 2 VICINITY, LCAAP-021 - AREA 21 - BUILDING 3 VICINITY, LCAAP-022 - AREA 22 - DEMOLITION-WASTE DUMP, LCAAP-023 - AREA 23 - SLUDGE BURIAL PITS, LCAAP-024 - AREA 24-SANITARY WASTEWATER TRTMNT , LCAAP-025 - AREA 25 - DEMOLITION WASTE DUMP, LCAAP-026 - AREA 26 - DEMOLITION DUMP, LCAAP-028 - AREA 28 - PIPELINE LEAKS, LCAAP-029 - AREA 29 - WESTERN BORDER DUMPS, LCAAP-030 - AREA 30 - BURNING PITS ASH DISPOSAL, LCAAP-031 - AREA 31 - FIREBREAK LANDFILLS, LCAAP-032 - AREA 32 - HOUSE BASEMENT, LCAAP-033 - Area 33 - Blending Pelletizing, LCAAP-034 - Area 34, Site Ditches)

IRA

(LCAAP-035 - AREA 35 -- SUMPS)

2007

RA(C)

(LCAAP-001 - AREA 1 - BUILDING 83 WASTEWATER LAGOONS, LCAAP-002 - AREA 2 - BUILDING 85 WASTEWATER LAGOONS, LCAAP-003 - AREA 3 - SANDPITS, LCAAP-004 - AREA 4 - BUILDING 139 - BACKLINE PONDS, LCAAP-005 - AREA 5 - BUILDING 139 IMPOUNDMENTS, LCAAP-007 - AREA 7 - IND. WASTEWATER LAGOON AREA, LCAAP-009 - AREA 9 - BUILDING 60 TREATMENT FACILITY, LCAAP-011 - AREA 11 - BURNING GROUND, LCAAP-012 - AREA 12 - LABORATORY WASTE LAGOON, LCAAP-013 - AREA 13 - BUILDING #35 DRAINAGE AREA, LCAAP-015 - AREA 15 - TEMPORARY SURFACE IMPOUNDMENT, LCAAP-016 - AREA 16 - ABANDONED LANDFILL, LCAAP-017 - AREA 17-SANITARY LANDFILL & SOLVENT PITS, LCAAP-019 - AREA 19 - BUILDING 1 VICINITY, LCAAP-020 - AREA 20 - BUILDING 2 VICINITY, LCAAP-021 - AREA 21 - BUILDING 3 VICINITY, LCAAP-024 - AREA 24-SANITARY WASTEWATER TRTMNT , LCAAP-030 - AREA 30 - BURNING PITS ASH DISPOSAL, LCAAP-036 - PBC Site at LCAAP)

PA

(LCAAP-000 - AREA 00 - Pyrotechnics Area)

RD

(LCAAP-001 - AREA 1 - BUILDING 83 WASTEWATER LAGOONS, LCAAP-002 - AREA 2 - BUILDING 85 WASTEWATER LAGOONS, LCAAP-003 - AREA 3 - SANDPITS, LCAAP-004 - AREA 4 - BUILDING 139 - BACKLINE PONDS, LCAAP-005 - AREA 5 - BUILDING 139 IMPOUNDMENTS, LCAAP-007 - AREA 7 - IND. WASTEWATER LAGOON AREA, LCAAP-009 - AREA 9 - BUILDING 60 TREATMENT FACILITY, LCAAP-011 - AREA 11 - BURNING GROUND, LCAAP-012 - AREA 12 - LABORATORY WASTE LAGOON, LCAAP-013 - AREA 13 - BUILDING #35 DRAINAGE AREA, LCAAP-015 - AREA 15 - TEMPORARY SURFACE IMPOUNDMENT, LCAAP-019 - AREA 19 - BUILDING 1 VICINITY, LCAAP-020 - AREA 20 - BUILDING 2 VICINITY, LCAAP-021 - AREA 21 - BUILDING 3 VICINITY, LCAAP-024 - AREA 24-SANITARY WASTEWATER TRTMNT , LCAAP-030 - AREA 30 - BURNING PITS ASH DISPOSAL)

SI

(LCAAP-000 - AREA 00 - Pyrotechnics Area)

2008

RA(C)

(LCAAP-000 - AREA 00 - Pyrotechnics Area, LCAAP-018 - AREA 18-BURNING PITS, LAGOONS & TRE)

IRA

(LCAAP-018 - AREA 18-BURNING PITS, LAGOONS & TRE)

2009

IRA

(LCAAP-010 - AREA 10 - FIRING RANGE WASTE DUMP)

RA(O)

(LCAAP-003 - AREA 3 - SANDPITS, LCAAP-024 - AREA 24-SANITARY WASTEWATER TRTMNT , LCAAP-030 - AREA 30 - BURNING PITS ASH DISPOSAL)

RI/FS

(LCAAP-010 - AREA 10 - FIRING RANGE WASTE DUMP)

2012

RA(O)

(LCAAP-036 - PBC Site at LCAAP)

IRP Schedule

Projected Phase Completion Milestones

See attached schedule

Projected Record of Decision (ROD)/Decision Document (DD) Approval Dates

Site ID	Site Name	ROD/DD Title	ROD/DD Date
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Final RA(C) Completion Date: 200809

Schedule for Next Five-Year Review: 2016

Estimated Completion Date of IRP at Installation (including LTM phase): 209909

LAKE CITY ARMY AMMUNITION PLANT IRP Schedule

= phase underway

SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-000	AREA 00 - Pyrotechnics Area	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-001	AREA 1 - BUILDING 83 WASTEWATER LAGOONS	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-002	AREA 2 - BUILDING 85 WASTEWATER LAGOONS	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-003	AREA 3 - SANDPITS	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-004	AREA 4 - BUILDING 139 - BACKLINE PONDS	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-005	AREA 5 - BUILDING 139 IMPOUNDMENTS	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-006	AREA 6 - BUILDING 65 IMPOUNDMENT	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-007	AREA 7 - IND. WASTEWATER LAGOON AREA	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-008	AREA 8 - SOLID WASTE LANDFILL	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-009	AREA 9 - BUILDING 60 TREATMENT FACILITY	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-010	AREA 10 - FIRING RANGE WASTE DUMP	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-011	AREA 11 - BURNING GROUND	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-012	AREA 12 - LABORATORY WASTE LAGOON	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-013	AREA 13 - BUILDING #35 DRAINAGE AREA	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-014	AREA 14 - TANK FARM	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-015	AREA 15 - TEMPORARY SURFACE IMPOUNDMENT	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-016	AREA 16 - ABANDONED LANDFILL	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-017	AREA 17-SANITARY LANDFILL & SOLVENT PITS	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-018	AREA 18-BURNING PITS, LAGOONS & TRE	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-019	AREA 19 - BUILDING 1 VICINITY	RA(O)						

LAKE CITY ARMY AMMUNITION PLANT IRP Schedule

SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-020	AREA 20 - BUILDING 2 VICINITY	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-021	AREA 21 - BUILDING 3 VICINITY	RA(O)						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-022	AREA 22 - DEMOLITION-WASTE DUMP	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-023	AREA 23 - SLUDGE BURIAL PITS	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-024	AREA 24-SANITARY WASTEWATER TRTMNT	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-025	AREA 25 - DEMOLITION WASTE DUMP	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-026	AREA 26 - DEMOLITION DUMP	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-028	AREA 28 - PIPELINE LEAKS	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-029	AREA 29 - WESTERN BORDER DUMPS	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-030	AREA 30 - BURNING PITS ASH DISPOSAL	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-031	AREA 31 - FIREBREAK LANDFILLS	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-032	AREA 32 - HOUSE BASEMENT	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-033	Area 33 - Blending Pelletizing	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-034	Area 34, Site Ditches	LTM						
SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
LCAAP-035	AREA 35 -- SUMPS	LTM						

LAKE CITY ARMY AMMUNITION PLANT
Army Defense Environmental Restoration Program
Compliance Restoration

CR Summary

Installation Total Army Environmental Database-Restoration (AEDB-R) Sites/Closeout Sites Count: 1/0

Installation Site Types with Future and/or Underway Phases

1 Contaminated Buildings
(CC-LCAAP-083)

Most Widespread Contaminants of Concern

Explosives

Media of Concern

Soil

Completed Remedial Actions (Interim Remedial Actions/ Final Remedial Actions (IRA/FRA))

Site ID	Site Name	Action	Remedy	FY
N/A				

Duration of CR

Date of CR Inception: 200701

Estimated Date for Remedy-In-Place (RIP)/Response Complete (RC): 201509/201509

Date of CR completion including Long Term Management (LTM): 201509

CR Contamination Assessment

Contamination Assessment Overview

Building 83 is a new compliance restoration (CR) site. The building is in the EE/CA process and may need RI/FS upon demolition.

Cleanup Exit Strategy

Once removal action completion has been achieved, analysis will be done to determine whether or not the site needs further remediation. At that time after LCAAP properly addresses any residual contamination found after the demolition is complete an RI/FS may be deemed necessary.

CR Previous Studies

Title	Author	Date
There are no Previous Studies		

LAKE CITY ARMY AMMUNITION PLANT

Compliance Restoration

Site Descriptions

Site ID: CC-LCAAP-083
Site Name: Building 83-TNR

STATUS

Regulatory Driver: CERCLA
Contaminants of Concern: Explosives
Media of Concern: Soil

Phases	Start	End
PA.....	200701.....	200705
SI.....	200706.....	201403
RA(C).....	201403.....	201509

RIP Date: N/A
RC Date: 201509

SITE DESCRIPTION

Building 83 is a 1,567 square feet wood-frame, split-level building constructed with asbestos siding. Building 83 was used as a production facility for TNR from 1942 until 1997. This product is used as a precursor for producing high explosive priming charges for the detonation of explosives, principally in the form of lead styphnate. The process completed in Building 83 stopped at TNR, and the final product of lead styphnate was not actually produced in this facility. TNR is an explosive that is extremely sensitive to heat, shock, or friction and is a Class A high explosive with the following characteristics:

- Insoluble in water;
- Unstable and deflagrates at 425 degrees Fahrenheit;
- Soluble in acids; and
- Condenses to form crystals which are more sensitive to heat, shock or friction than when in its liquid form.

The manufacturing process conducted in Building 83 used large quantities of concentrated sulfuric acid and red fuming nitric acid in a nitrating process for the primary explosive lead styphnate. The chemical process involves the sulfonation and the nitration of resorcinol, which results in the formation of solids known as styphnic acid, or TNR. The nitration process is known to release various types of oxides of nitrogen. These oxides appear to have contaminated surfaces and penetrated porous interior materials that exist within the structure of Building 83. Explosives residue is apparent based on the visual observation of staining in the building on the floor, equipment, panels, porous interior materials, and other building structures. The building is visibly deteriorating and in disrepair, with detached doors and missing windows.

A Site Investigation (SI) of several explosively contaminated LCAAP facilities was conducted by PIKA International, Inc. (PIKA) in September 2007. The SI included a site visit, summary of health and safety hazards, and recommendation for decontamination. The SI included the recommendation that Building 83 be thermally decontaminated through the application of limited venting procedures followed by the application of the Thermal Convection System (TCS).

Through a review of site conditions and site history, as well as an evaluation of the available sampling data, the COCs for Building 83 were determined. The primary COCs are asbestos and explosives, and lead is a potential COC. Based on limited available data, it is not anticipated that media is impacted by PCBs. Based on previous site visits, hazardous materials such as mercury switches and light ballasts were not observed and are not believed to be of concern.

LCAAP plans to demolish Building 83 under a non-time critical removal action (planned March 2014), pursuant to the Comprehensive Environmental Response, Compensation, and Liabilities Act. A Draft Engineering Evaluation and Cost Analysis (EE/CA) was prepared in August 2012 to evaluate remedial approaches to mitigate the safety and environmental hazards associated with Building 83 in 2012. The EE/CA identified demolition of the building with debris (asbestos and explosive) being properly abated and disposed of properly. Once the EE/CA process is completed (e.g., the EE/CA and Action Memorandum are approved by EPA and MDNR, planned July 2013), a work plan will be prepared and submitted for regulatory review that

will include the design details required to implement the recommended action. A closure report will be prepared and submitted following completion of the removal action.

This site is approved and funded under the Environmental Restoration; Army (ERA) program with a cost estimate from PIKA.

Site ID: CC-LCAAP-083
Site Name: Building 83-TNR

Upon completion of the removal action and in accordance with the CERCLA process, and if deemed necessary, will properly address any residual contamination found after the demolition is complete. The site will proceed to the RI/FS phase, as appropriate.

CLEANUP/EXIT STRATEGY

Once removal action completion has been achieved, analysis will be done to determine whether or not the site needs further remediation. At that time after LCAAP properly addresses any residual contamination found after the demolition is complete an RI/FS may be deemed necessary.

Site Closeout (No Further Action) Summary

Site ID

Site Name

NFA Date

Documentation

There are no NFA sites

CR Schedule

Date of CR Inception: 200701

Past Phase Completion Milestones

2007

PA (CC-LCAAP-083 - Building 83-TNR)

Projected Phase Completion Milestones

See attached schedule

Projected Record of Decision (ROD)/Decision Document (DD) Approval Dates

To Be Determined

Final RA(C) Completion Date: 201509

Schedule for Next Five-Year Review: 2016

Estimated Completion Date of CR at Installation (including LTM phase): 201509

LAKE CITY ARMY AMMUNITION PLANT CR Schedule

 = phase underway

SITE ID	SITE NAME	PHASE	FY14	FY15	FY16	FY17	FY18	FY19+
CC-LCAAP-083	Building 83-TNR	SI						
		RA(C)						

Community Involvement

Technical Review Committee (TRC): 198706

Community Involvement Plan (Date Published): 201104

Restoration Advisory Board (RAB): RAB established 199703

RAB Adjournment Date: N/A

RAB Adjournment Reason: None

Additional Community Involvement Information

A TRC met every quarter from December 1987 until December 1996. In 1996, LCAAP held a public meeting to determine if there was interest in forming a RAB. The RAB first met in May 1997 and met every two months thereafter. Since January 1999, RAB meetings have been held quarterly.

In January 2005 the community relations plan for LCAAP was updated and during that year the RAB met five times. Also, two public availability meetings were held for the Area 10 Sand Piles and inactive sumps removal actions. From 2005 until 2012, the RAB has met quarterly.

In 2012, the RAB frequency changed to semiannual. RAB notices are scheduled two weeks prior to meetings in The Examiner newspaper. The notice includes a letter sent to the surrounding neighbors before the meeting.

Administrative Record is located at

Lake City Army Ammunition Plant
7 and 78 Highway, Building 5
Independence, MO 64051-1000
Phone 816-796-7159

Information Repository is located at

Mid-Continent Public Library
317 W. US Hwy. 24
Independence, MO 64050-2747
Phone 816-252-0950

Current Technical Assistance for Public Participation (TAPP):N/A

TAPP Title: N/A

Potential TAPP: N/A

